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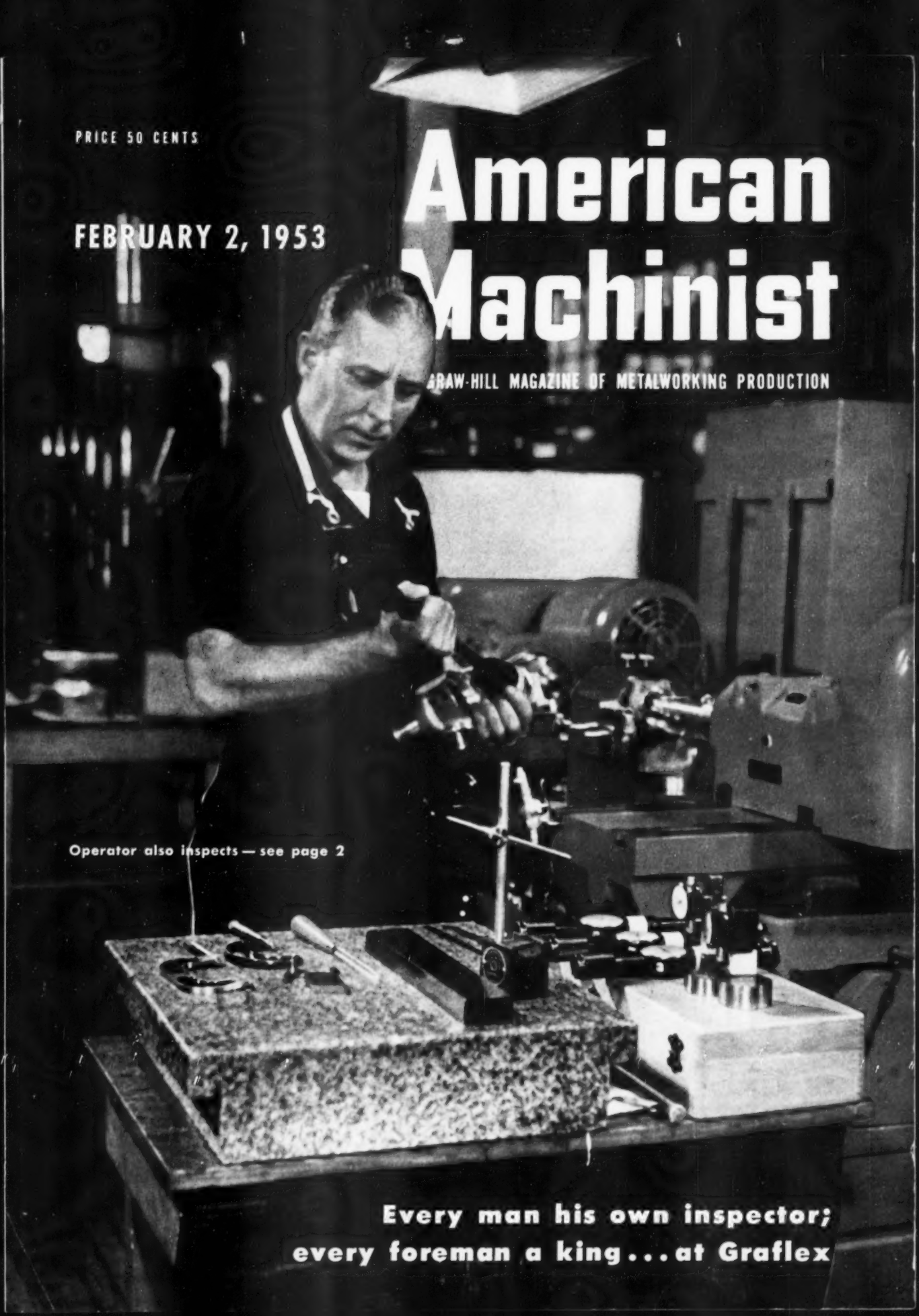
FEBRUARY 2, 1953

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Operator also inspects — see page 2

Every man his own inspector; every foreman a king . . . at Graflex

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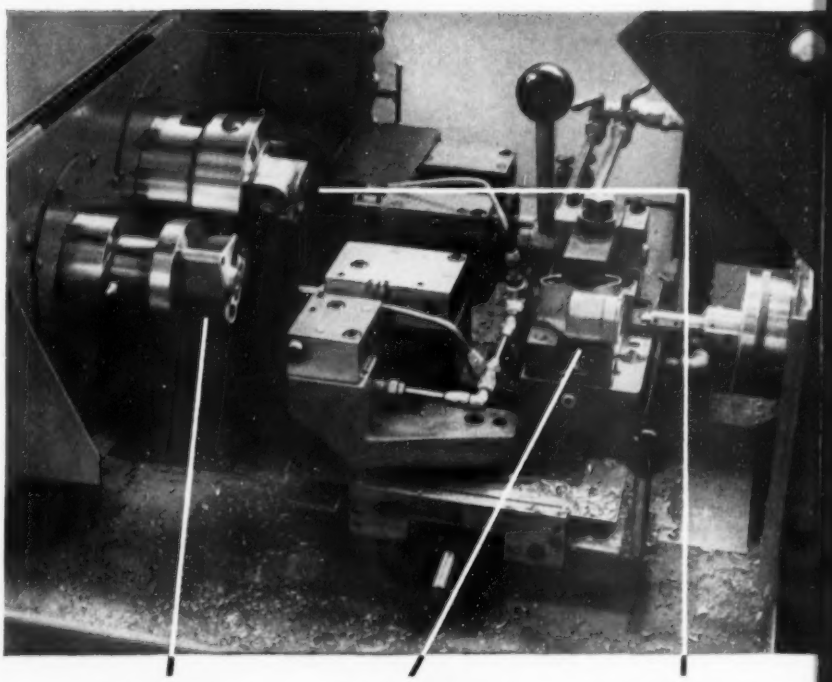
speeds precision finishing of complex, multi-surface work

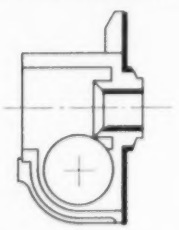
Heald Model 221 Bore-Matic finishes 9 different surfaces in 3 sequential operations



Here, in effect, are three machines in one—a single, versatile Heald Bore-Matic with three different fixture stations each having its own workholding and tooling features. The parts—precision instrument housings—are bored, faced and turned on 9 different surfaces in three consecutive operations. The machine cycle is fully automatic. The first and third operations are performed simultaneously on the left hand end of the machine; the second operation is performed on right end.

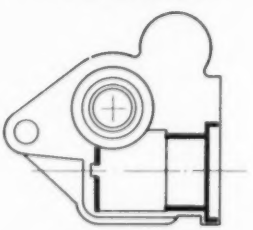
This is another typical example of the extreme versatility of Heald Bore-Matics—permitting highly specialized operations on a basically standard machine. Remember—when it comes to precision finishing, it pays to come to Heald.

1st OPERATION



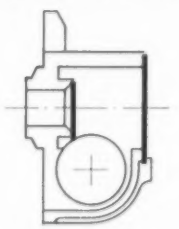
Rotating stake fixture holds the part on the left front station. Tooling on cross slide performs the boring, turning and facing operations indicated above.

2nd OPERATION



Part is clamped on platen type fixture on cross slide. Rotating tools on right-hand boringhead perform the two boring and two facing operations indicated.

3rd OPERATION



Rotating finger fixture on left rear boringhead holds work. Tooling mounted on cross slide performs the final two facing operations as indicated above.

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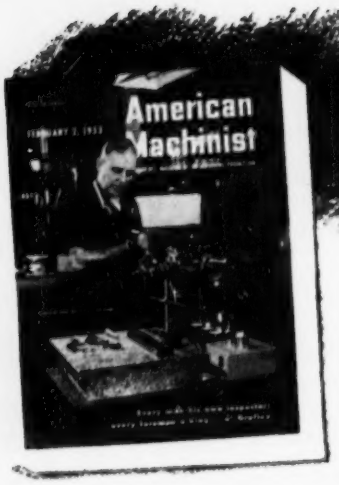


Chips & Quips

Self-Checker . . . Operators at Graflex, Inc, Rochester, NY, do their own inspecting—and get paid for it. If they don't . . . but that's part of our current Special Report, which is another in the series of editorial look-sees through outstanding plants.

Which reminds us that recently a fellow Hoosier dropped in. His plant has been a subcontractor on jet-engine parts for GE. To prepare for the work, he read our Special Report on the GE turbojet plant at Lynn, Mass., then asked to visit the plant. The request was granted, and he spent several days at it—but found, he said "there was nothing I saw there that you hadn't already described in your Report." That's what we try to do, to cover the new, the different, the ideas you can adopt or adapt. It's nice to know we succeed on occasion.

To get back to Graflex: Our cover Kodachrome shows an operator checking a part for a military telescope after boring it on the Ex-Cell-O machine in the background. You'll note that he has full gaging equipment. Jim Burns took the picture, along with some 40 black-and-whites which appear in our Special Report on the company's production methods. . . . There's another unusual thing in management at that plant, too—every foreman has practically full authority in his department. We tell how that works, too, so you'd better look the story over carefully.

Splitting . . . Flat copper stock can be split axially to make flanges, replacing forming operations and eliminating a former plating problem. M Huisman, of the Netherlands, gives the details in an article in this issue.

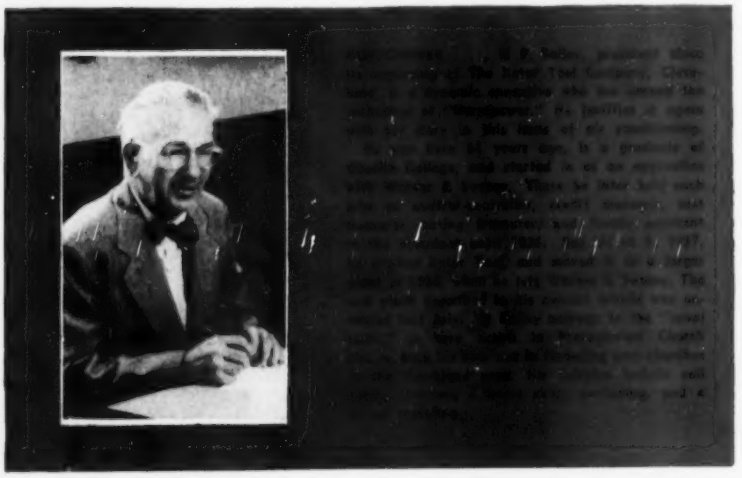
Air Conditioning . . . Rotor Air Tool recently moved into a new plant in Cleveland, unusual in the colors used and in the economy of construction—particularly for the low cost of the air conditioning. We asked H P Bailey, president of the company, to give us details. He has done so in our lead article, an unusual story for us but a very good thought-provoker for management men wherever hot days force summer closings. The plant is only 40,000 sq ft (8000 of it offices). Cost per employee per hour for the five summer months is 3¼¢, but greater efficiency and cleanliness and closer machining limits help to pay that back.

More on Automation . . . We've brought you as much on Ford automation as we felt would be useful to you—as quickly as it was possible to get it. To round out earlier material, we have now extracted a short on organizing such a program from a recent speech by John McDougall of the manufacturing staff at Ford. It covers personnel needed, how automation design ties in with layout planning, tool design and estimating. It answers such questions as where to start and when to figure costs.

Brazing Costs 30% Less . . . R E Ballantine, welding engineer for Westinghouse, advocates the case for thin phos-copper strip for brazing. It's rolled to 0.005 in. thick, pre-cut and pre-placed to make better joints in copper and its alloys quicker and with less material. There is lots of know-how here, plus a number of examples. Average cost reduction is 30%.

Sugar No Good . . . Joseph A Goodbar, toolroom foreman at Westinghouse, Lima, reports that sugar was formerly used as a lubricant in blanking out motor laminations from high-silicon electrical-grade steel. Now, however, the stock is flame-heated instead—and die life is much improved. His explanation is a 2-page article.

Coming . . . *AM* for Feb 16 will include the last of our new series on Tools of Our Trade, this one being "How to Run a Miller." There'll also be a fold-out on wheel selection for grinding carbides, and articles on diemaking, gear-making, saving dies, assembly fixtures, estimating machining times, and several others. There is also a striking 4-color cover showing a jig borer at work.



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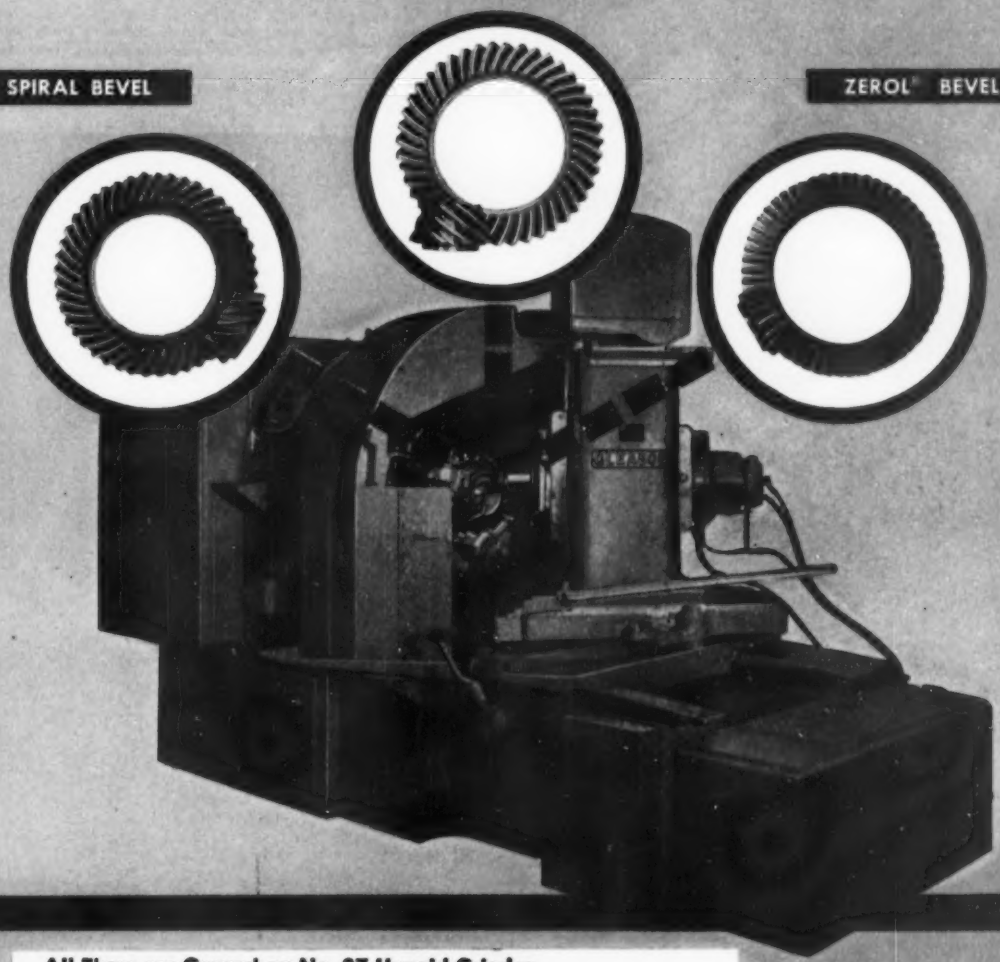

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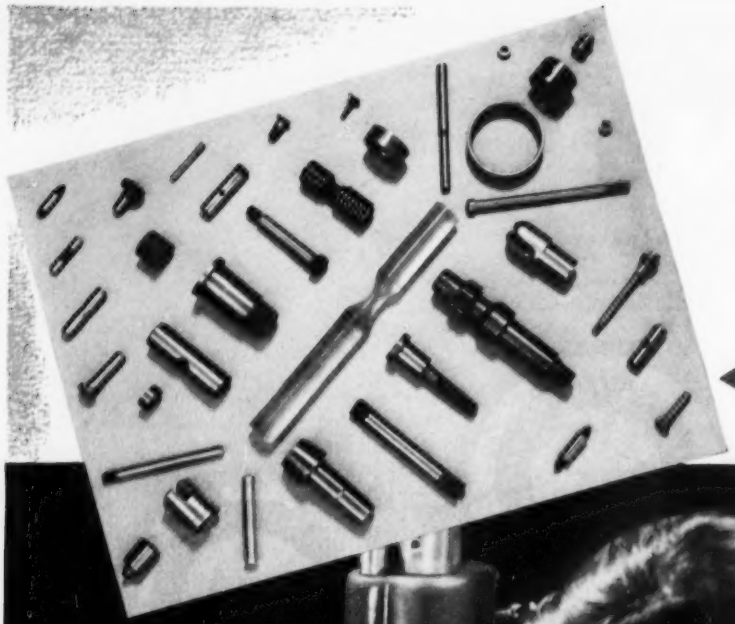
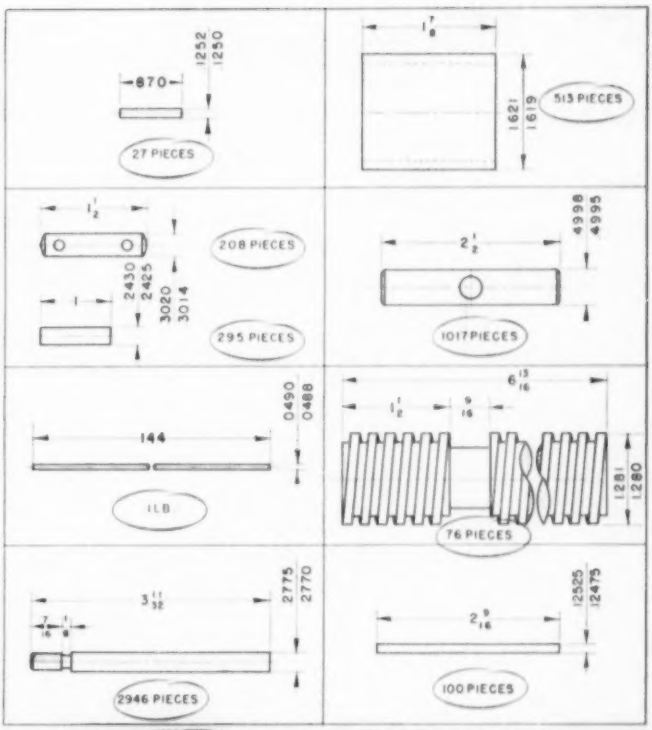


Left: These widely differing parts were all finished economically by centerless grinding. Materials include iron, steel, stainless steel, brass, aluminum, plastic.

advantage of the Centerless Method

GRINDING SMALL QUANTITIES

Nearly everyone knows about the advantages of centerless grinding *large quantities* of parts on a CINCINNATI FILMATIC No. 2 . . . the uniformly high quality of performance . . . simplicity and ease of operation . . . low cost of production. But not many know that these advantages can also be realized for wide varieties and *small quantities* of parts assigned to a CINCINNATI. How can it be done? There are two main considerations: 1) Group together all parts requiring a particular type of setup. You will eliminate frequent changes from thrufeed to infeed jobs. 2) Group all parts together by diameter. It takes less time to change the setup for a small difference in diameter than a large difference. ¶It will certainly be to your advantage to investigate CINCINNATI FILMATIC No. 2 Centerless Grinders for a wide range and small quantities of parts. A more complete story of economical small parts production may be obtained by writing for "Principles of Centerless Grinding," publication No. G-503-2.



CINCINNATI GRINDERS INCORPORATED
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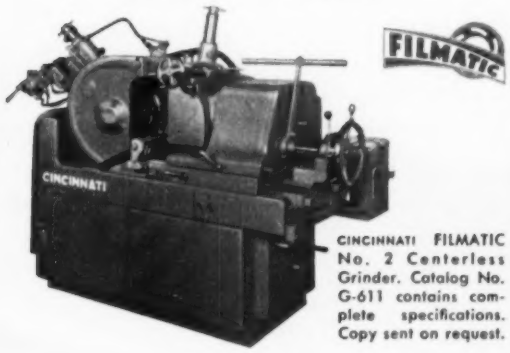
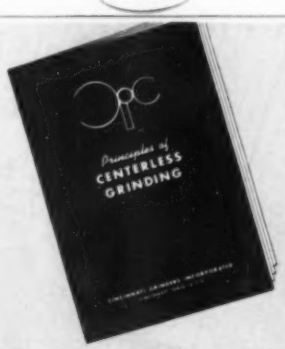


CINCINNATI FILMATIC No. 2 Centerless Grinder. Catalog No. G-611 contains complete specifications. Copy sent on request.



This booklet "Principles of Centerless Grinding" explains the principle of operation; tells how to set up and estimate production for CINCINNATI FILMATIC Nos. 2 and 3 Centerless Grinders. The illustration above appears under the subject "How to Economically Grind Small Lots on a Centerless." Write for a copy of this informative booklet—publication No. G-503-2.

Left: Close-up of a CINCINNATI FILMATIC No. 2 Centerless Grinder set up for a typical infeed job. The Hydraulic Profile Truing equipment over the regulating wheel is especially desirable on machines used for small lot production.

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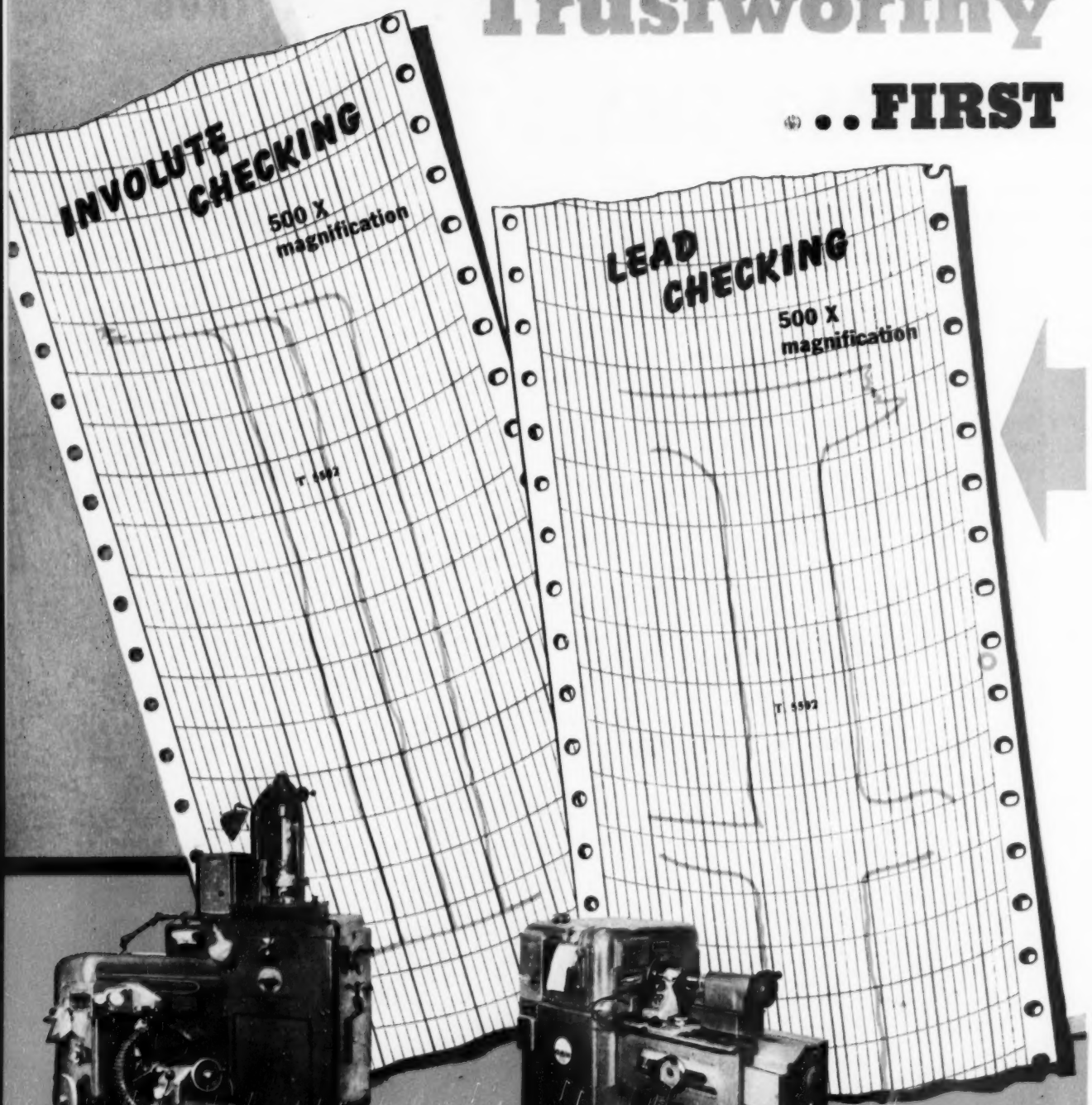

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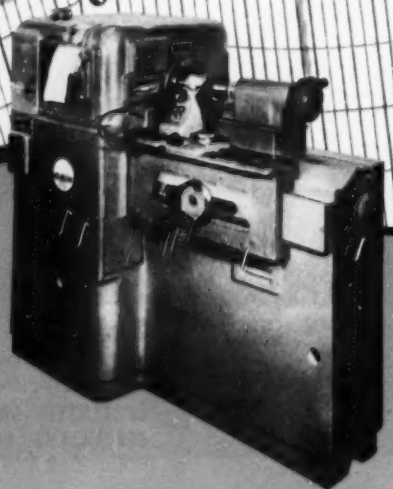

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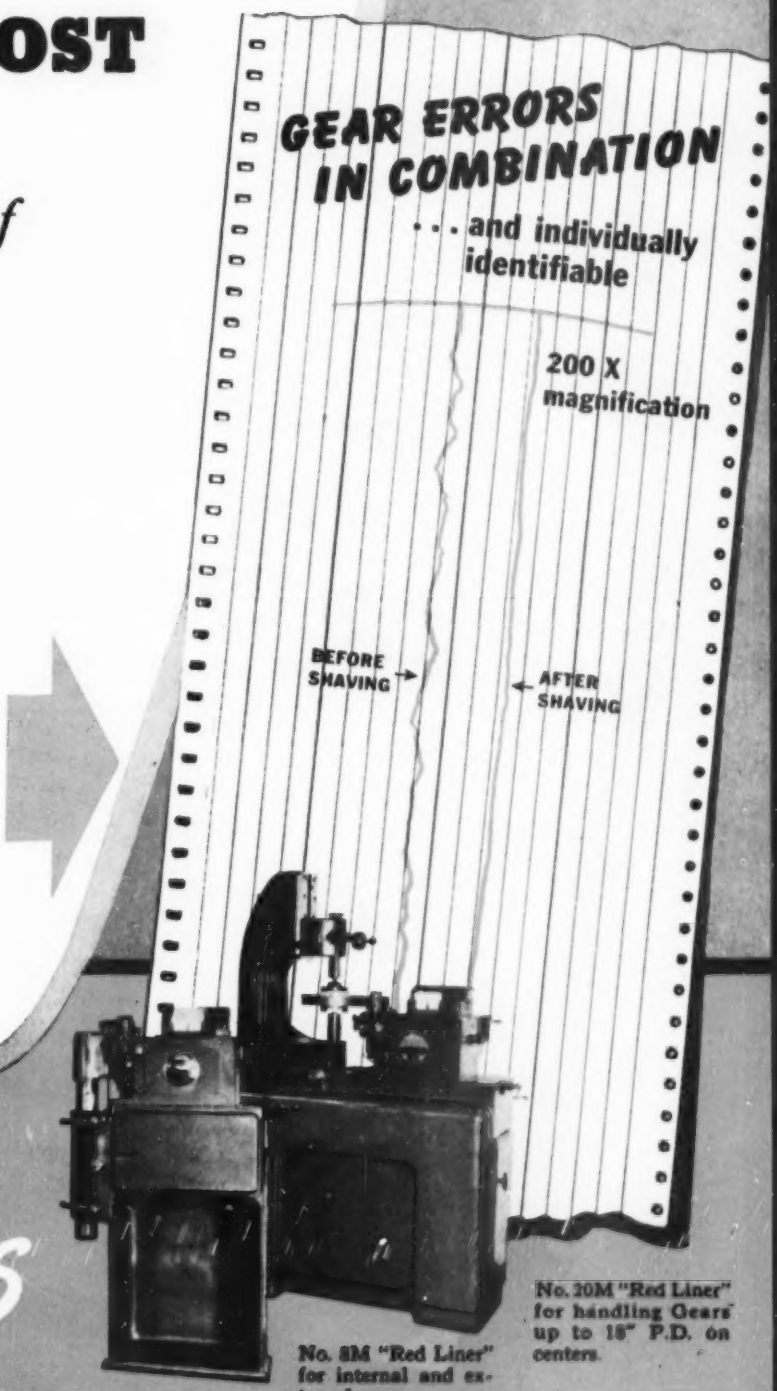

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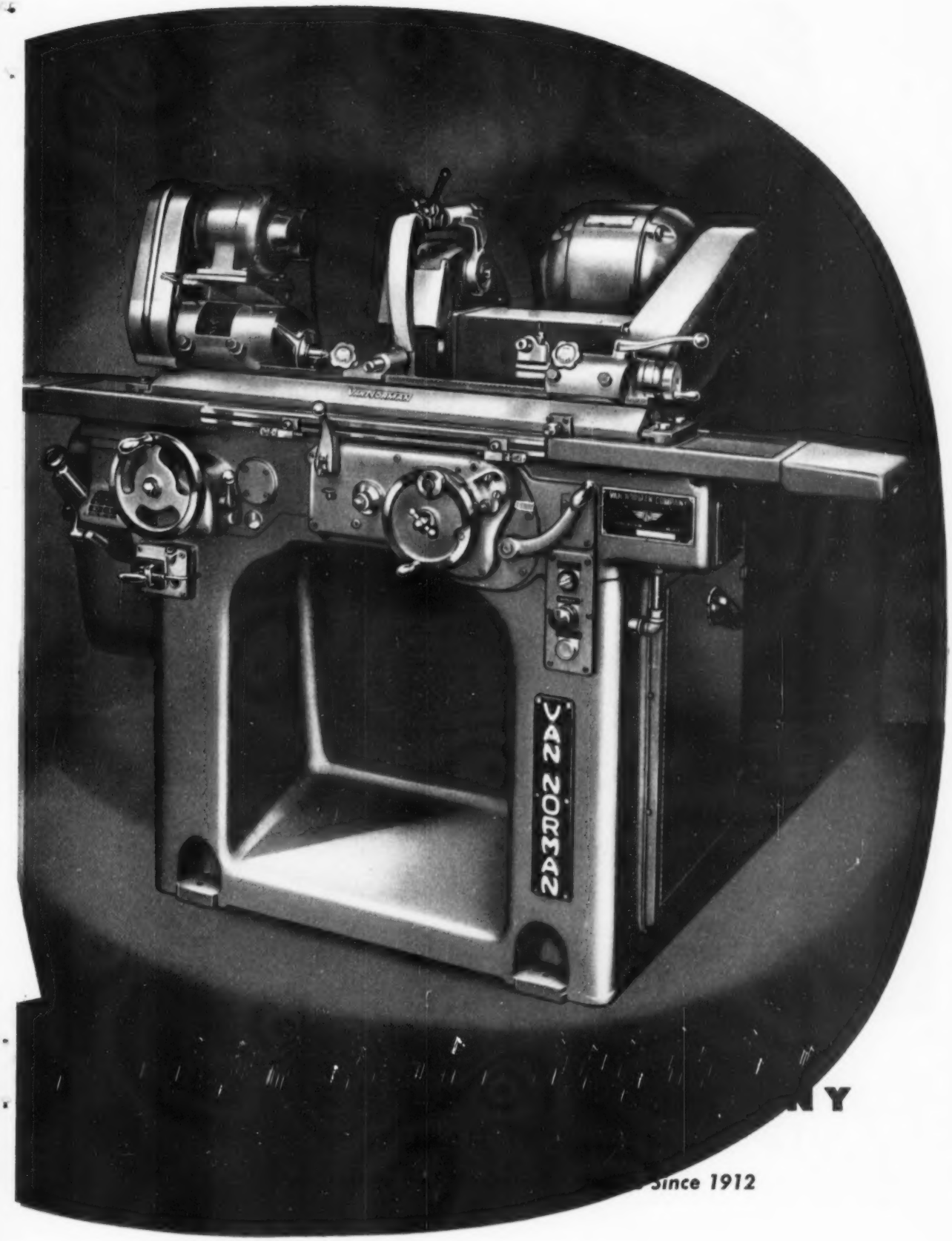

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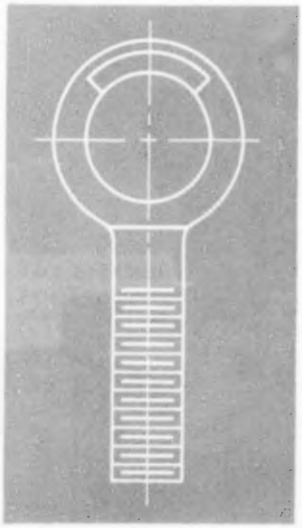

Eye bolts, for use in the assembly of switchgears, are now threaded on 1" Double LANDMACO Leadscrew Threading Machines in the Philadelphia plant of a large Eastern manufacturer. Records show that costs by previous methods averaged 120% higher.

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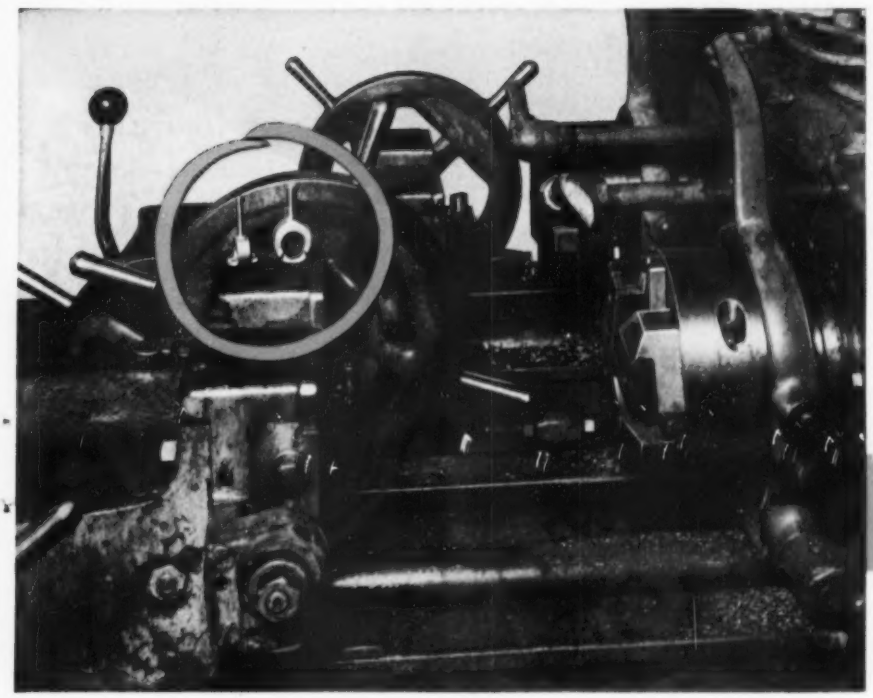
This is one of many examples where LANDIS Threading Equipment has significantly reduced operating costs—others show increased production, better quality, lower maintenance, etc. Further information on LANDMACO Leadscrew Machines and all LANDIS Threading Equipment will be furnished promptly on request. Please give specifications when writing.



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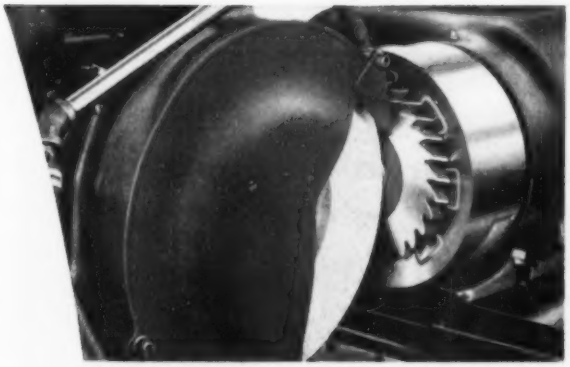
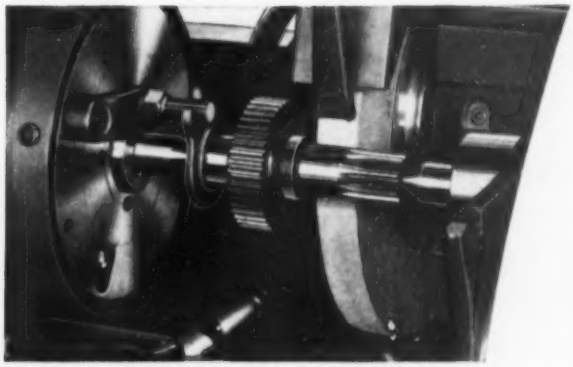
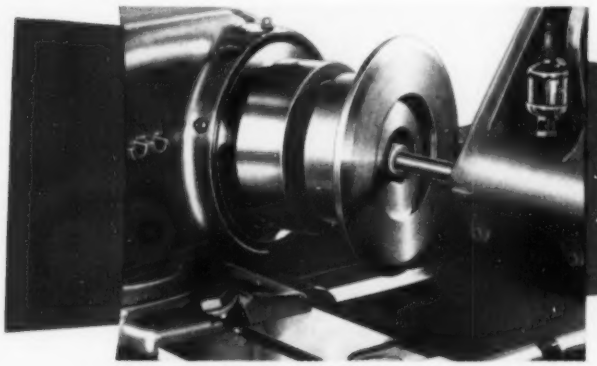


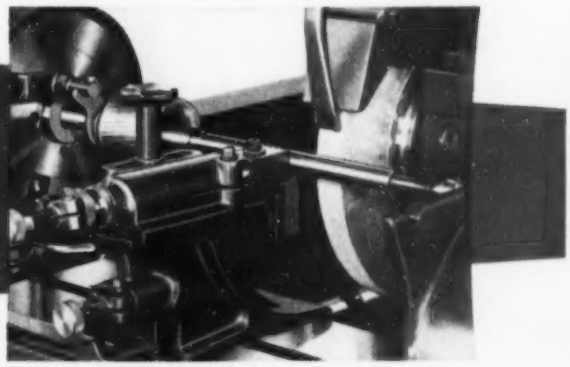
FACE GRINDING—magnetic chuck and low, compact swivelling headstock. Operator can make fast selection of correct speed.



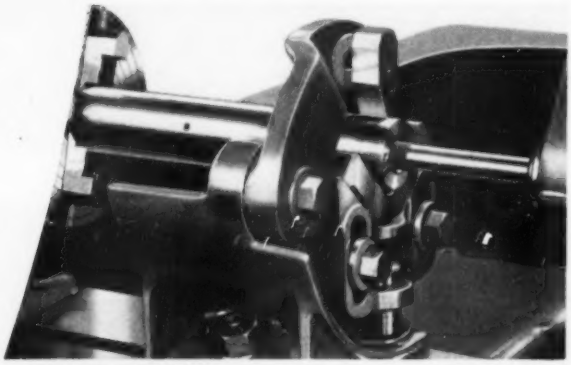
INFEED GRINDING—precision wheel feed and Microsphere wheel spindle bearings give accurate results and fast sparkout.



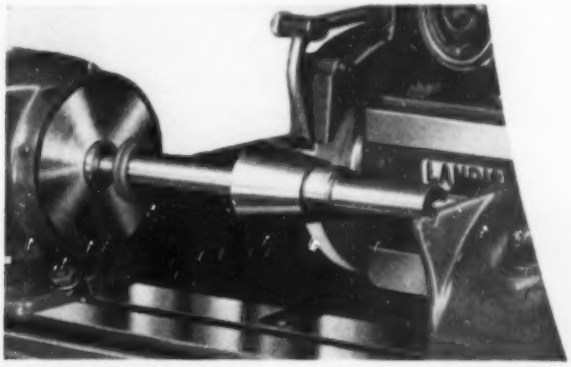
INTERNAL TAPER GRINDING—modern swing-type fixture provides quick changeover from external to internal grinding operations.



TRAVERSE GRINDING—use of automatic wheel feed saves time on short run traverse grinding jobs.



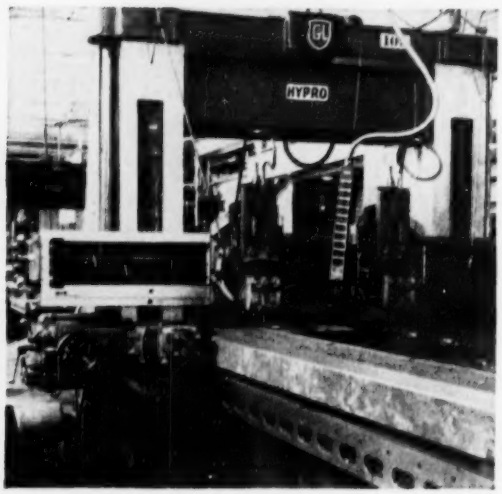
INTERNAL GRINDING—deep hole inside long work piece held in chuck and center rest. Wide variety of quills and wheels available.



TAPER GRINDING—tapers are easily ground. Piece shown has taper of 14° included angle. Wheelbase and headstock also swivel.

Planing semi-steel at 300 feet per

G&L Hypro Planer's power and rigid construction permit year in, year out, optimum accuracy in high speed carbide cutting to 1" depth at feeds from 3/64" to 1/8"



This photo shows the G&L Hypro Planer's fourth cutting head. On this operation, all cutting heads are used — production is increased, setup time is minimized.

SINCE 1947, Rice Barton Corp. of Worcester, Mass., has been using two G&L HYPRO Double Housing Planers to produce parts for paper mill and textile machinery. With them, semi-steel castings (30 to 40% steel), are being planed at speeds from 240 to 300 surface ft. per minute . . . with depth of cuts from ¼ to 1 inch . . . feeds from .045 to .125 inch. Mild steel parts are being planed at the same speeds, but at a maximum depth of ½ in. and a feed of approximately .030 inch.

Though shock on the carbide tools is very great due to irregular contours and interrupted surfaces, no tools have been broken in nearly a year of operation. This economical use of carbide tools is primarily possible because the G&L planers have the following features — sufficient power, (50/100 hp variable voltage drives) — double helical table drive which provides a straight flow of power with no side thrust — rigid construction of rail as well as rail head — and inverted dovetail slide construction.

If you'd like to know how G&L machine tools can help you speed your work by taking advantage of the latest cutting tool developments contact your nearest G&L representative and he'll be glad to give you the details on the G&L Job Analysis Service. If you don't know where to reach him, write direct.

GIDDINGS & LEWIS

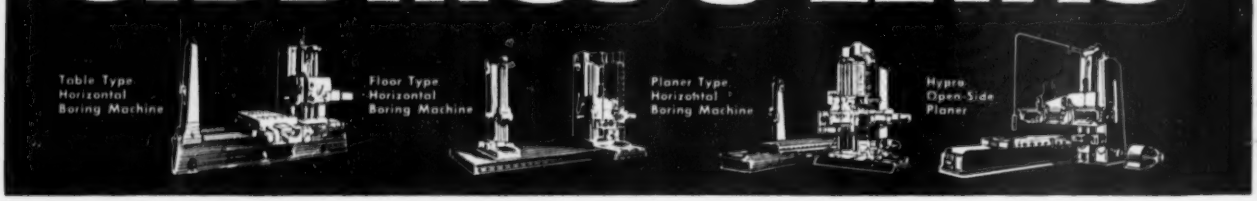


Table Type Horizontal Boring Machine
Floor Type Horizontal Boring Machine
Planer Type Horizontal Boring Machine
Hypro Open-Side Planer

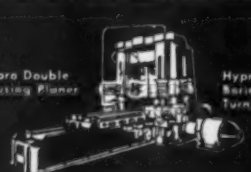
castings minute !

Rice Barton Corporation's G&L HYPRO Planers measure 78 by 72 inches by 20 ft. long and 66 by 56 inches by 20 ft. long and are powered by 50/100 hp variable voltage drives.

G-22

MACHINE TOOL CO.

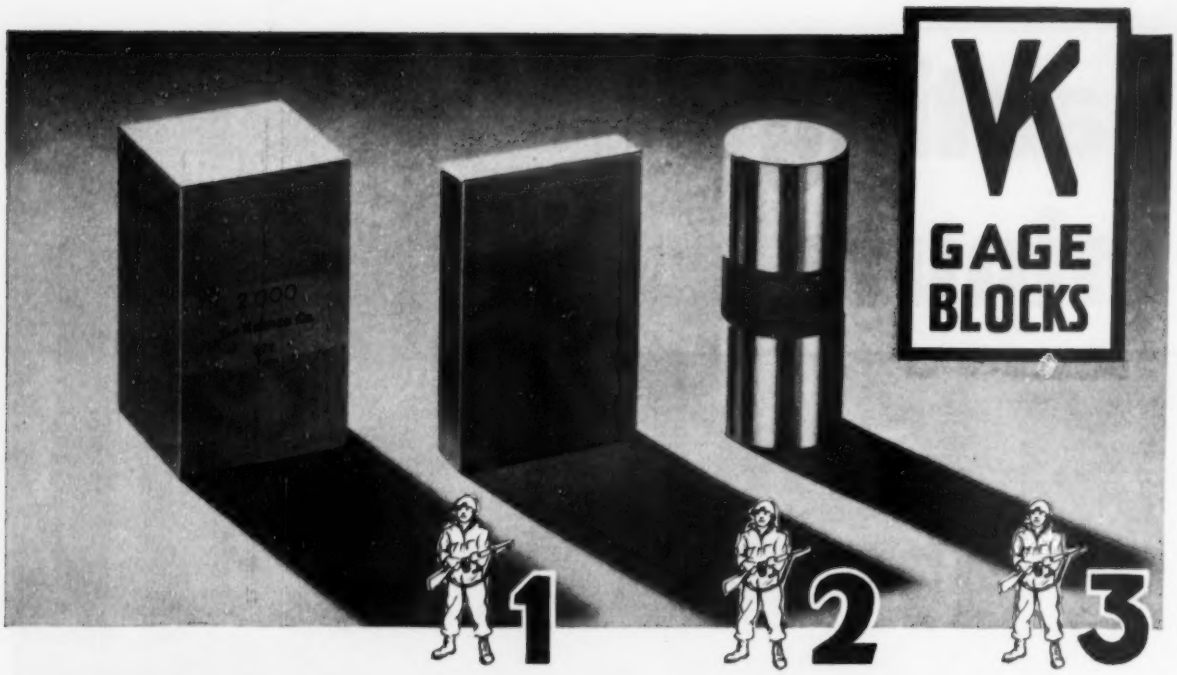
Hypro Planer Type Milling Machine


Hypro Double Housing Planer

Hypro Vertical Boring and Turning Mill

G&L HYPRO

FOND DU LAC
WISCONSIN



SOLDIERS THREE... *defending production accuracy*

To meet the requirements of the current defense effort in meeting closest limits of accuracy and protecting production, Van Keuren is currently furnishing three types of gage blocks:

1—SOLID SQUARE MASTER BLOCKS
2—RECTANGULAR REFERENCE GAGES
3—MICROGAGES

Shipment on complete sets of any of these three types can be made within 60 days from receipt of order.

VK Solid Square Master Blocks are accurate to .000004" per inch of length and are designed for laboratory use or to standardize all shop dimensions. Large wearing surface; perfect parallelism. Available in 85- and 41-block sets and guaranteed unconditionally for 5 years not to exceed .0001" in wear.

VK Rectangular Reference Gages are guaranteed accurate to .000008" per inch of length and are designed for the inspection department or precision set up work. They are available in 81-block and 33-block sets. Individual blocks from either of these sets can also be furnished. Certificate of size is also furnished with each set.

VK Microgages are accurate to plus .000012", minus .000008" per inch of length and are designed as working gages for shop use . . . to put accuracy at the machine. Wearing surface is 40% greater than that of rectangular gage blocks, hence their long-wearing quality. Available in several set combinations.

Van Keuren Gage Blocks are fully described in Catalog and Handbook No. 35, yours for the asking by writing: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

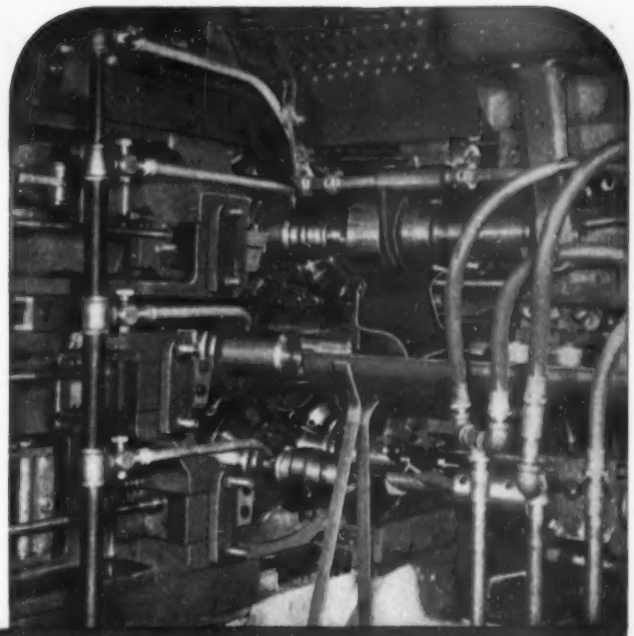
VK
34th YEAR

THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

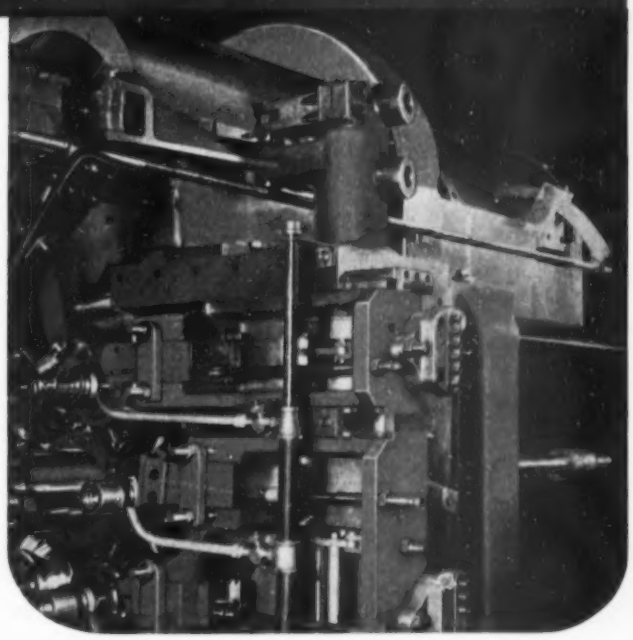
The main end slide of a 3½-SIX figures prominently in producing the above piece. Its total length is 34½ ins. Its diameter is 12 ins. Its swing for die heads, etc., is 4 ins. The maximum recommended load for the slide is 12,000 foot pounds. Its bearing area is approx. 258 sq. ins.



Front Side of Tooling Area

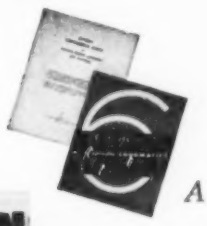
BETTER BEFORE THAN AFTER

Rear Side of Tooling Area

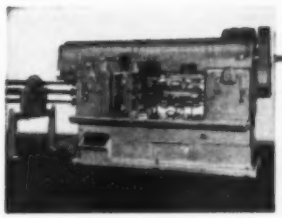


What an "automatic" does *after* it goes into production is information for which you have already paid a purchase price. How much more you will pay for operation and maintenance costs will determine the completeness and dependability of that information.

It is always better to have complete and dependable information *before* the purchase than after. You can have it on CONOMATICS.



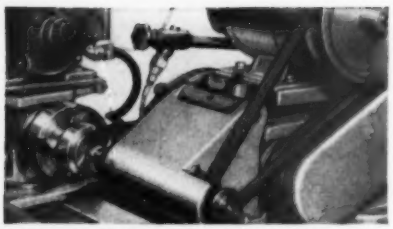
A Comparison of ALL Automatics is in favor of Cone



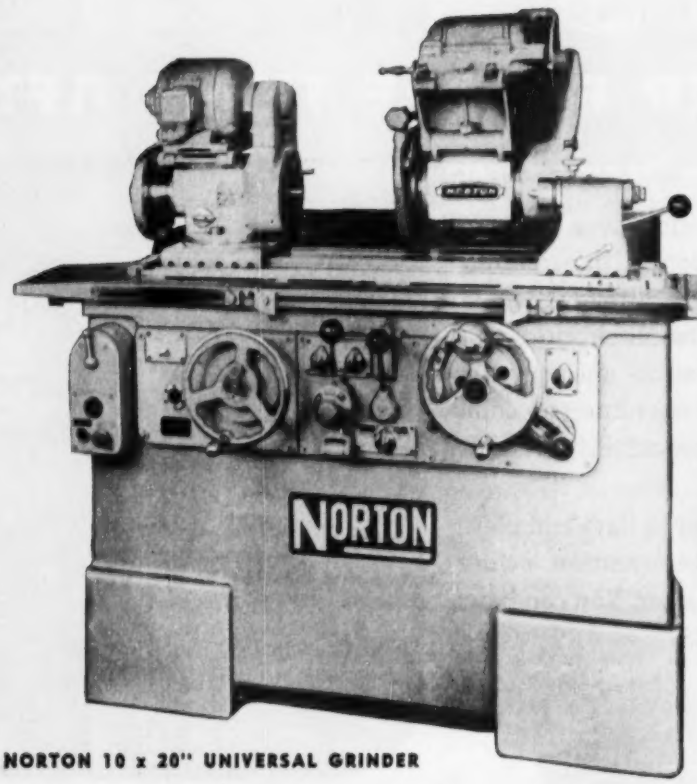
Conomatic CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Versatility with a . . .

EXCEPTIONALLY SMOOTH HYDRAULIC TRAVERSE with independent right and left-hand dwell control — automatic wheel feed at each reversal.



INDIVIDUALLY POWERED INTERNAL SPINDLE permanently hinged to front of wheel slide for maximum convenience and rapid set-ups.



NORTON 10 x 20" UNIVERSAL GRINDER

Additional features are described in Catalog 170. Write for your copy today.

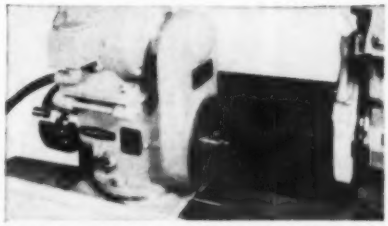
Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASS., U. S. A.

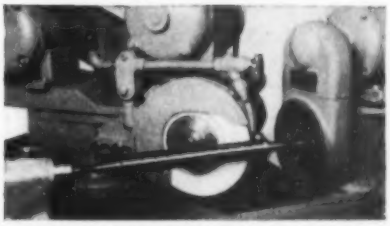
DISTRICT SALES OFFICES: HARTFORD • NEW YORK • CLEVELAND • CHICAGO • DETROIT

NORTON 10x20" UNIVERSAL GRINDER

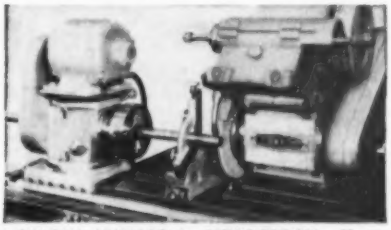
simplified set-up . . . smooth performance



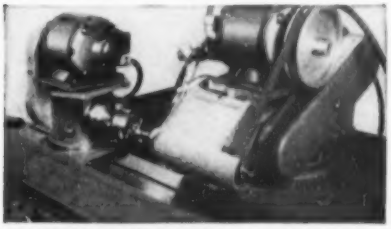
CONVENTIONAL or SPEED CHUCKS may be left permanently mounted on one end of headstock spindle. Headstock quickly swivelled 180° to bring chuck into position.



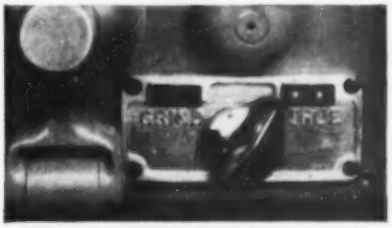
INTERCHANGEABILITY permits reversing head and footstock positions to eliminate necessity of changing wheel and drive to other end of spindle.



HOLLOW SPINDLE in HEADSTOCK allows work up to 1" in diameter (and which is longer than machine) to be passed clear through.



COMPOUND WHEEL SLIDE permits swivelling of wheel head to any angle and wheel feed at any angle.



PRESET TRUING SPEED CONTROL enables table speed settings to remain undisturbed during truing. Independent right and left-hand dwell controls.

The **versatility** of the NORTON 10 x 20" Universal Grinder goes beyond efficient performance of external, internal, face, and angular wheel feed grinding.

Head and footstock positions are interchangeable permitting simplified set-up on jobs involving shoulders or spacers. Set-ups are made easier on chucking jobs by the D1-3" camlock nose on one end of the headstock spindle which permits permanent chuck mounting. The chuck is quickly positioned by swivelling the headstock.

The headstock spindle is designed to take a workpiece up to 1" diameter clear through. This permits an extra long piece to be ground by chucking at one end and passing the remainder through.

For ease of set-up, the internal spindle is a hinged-bracket type, attached to the front of the wheel slide. This spindle is quickly swung into position for internal grinding — or is as quickly swung out of the way.

The wide versatility of this machine demonstrates again how you economize when you modernize with a new NORTON Machine.

To Economize Modernize with NEW **NORTON** GRINDERS and LAPPERS

M608

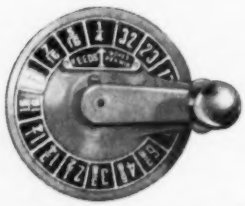
5 MINUTES PER VERSATILE NEW CH

KEARNEY & TRECKER MILWAUKEE

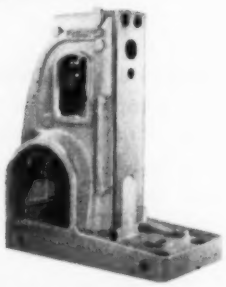
Speeds fabrication of aircraft parts from 75ST aluminum alloy

CH MILLING MACHINE FEATURES THAT HELPED INCREASE OUTPUT — CUT COST PER PIECE

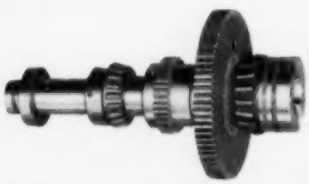
Speed range — *16* speed changes are provided from *25* to *1500* rpm. Automatic protecto-mesh mechanism permits nonclash shifting during speed changes.



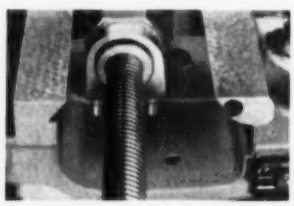
Extra-wide feed range — *16* feeds from ¼" to *32"* per minute meet requirements of new metals and cutting tools for most efficient operation.



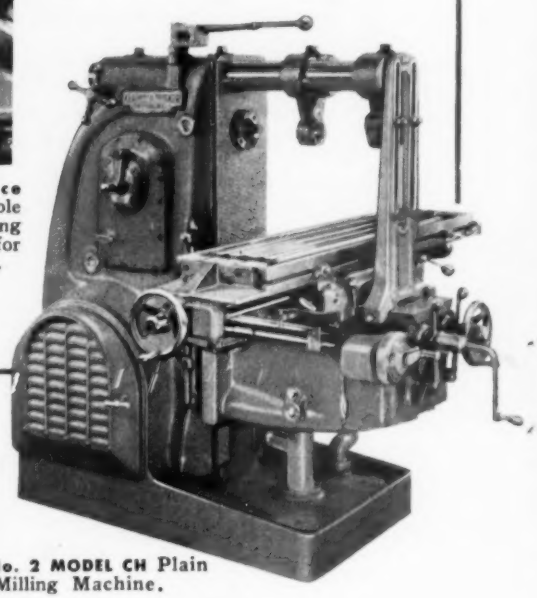
Greater rigidity — Entirely new column . . . heavily ribbed, box section, sponson construction . . . absorbs vibration from heaviest cutting loads.



Greater cutting efficiency design refinements in 3-bearing spindle and a train of heavy duty, wide-faced, forged steel gears, hardened and specially processed.



Smoother feed performance through a heavy duty 2" dia. table feed screw. *23%* greater bearing contact between screw nut for longer screw life and accuracy.



5 hp No. 2 MODEL CH Plain Style Milling Machine.

INVESTIGATE the versatile new CH line of milling machines. Their features are job proven to give you cost-cutting results plus greater productivity, better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

PIECE WITH THIS MILLING MACHINE

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

HERE ARE THE FACTS ON THIS JOB:

Location: Mar Vista Engineering Co., Los Angeles, Calif.

Machine: No. 2, Model CH, 5 hp, Plain Style, used with Universal Milling Attachment.

Part: Aircraft fitting for horizontal stabilizer.

Material: 75ST aluminum alloy.

Cutter: One blade — 8" fly blade.

Cutter Speed: 875 rpm, 9 ipm feed.

Depth of Cut: .050".

Production: 12 pieces per hour — all sides milled.

MODERNIZATION PAYS OFF

6 machines now do the work of 17!

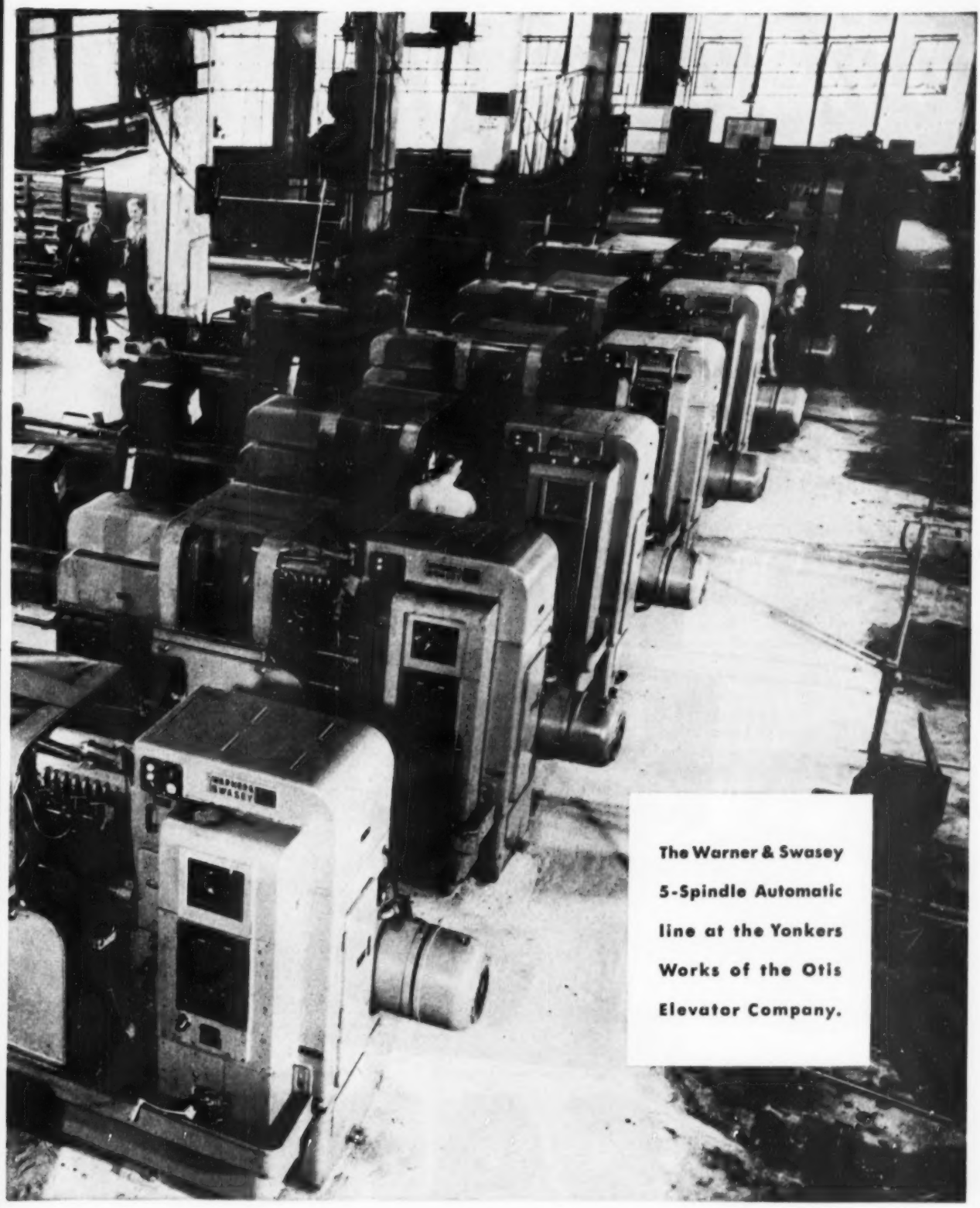
• As part of their modernization program, Otis Elevator Company replaced 17 machines with 6 Warner & Swasey 5-spindle Automatics. These automatics are used at Otis for short runs on specially-machined parts—studs, bolts, nuts and other screw machine products—required for custom-made elevators.

The results of this modernization program: increased production in less floor space, more uniform parts, and six critically needed men released for work elsewhere in the plant. At Otis only 3 men are required to set up and operate these 6 automatics.

Because of its quick setup and ease of operation, the Warner & Swasey 5-spindle Automatic makes automatic production economical on short runs as well as large lots. It's a machine designed to meet the requirements for lasting accuracy and increased production for the years ahead.

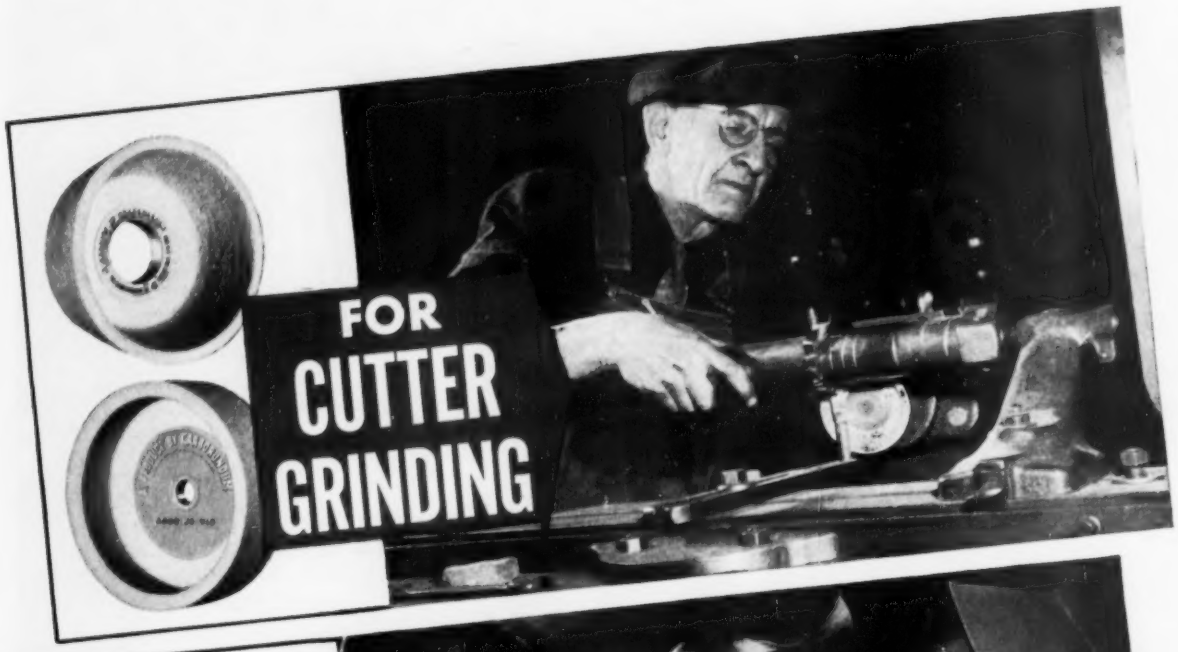
WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

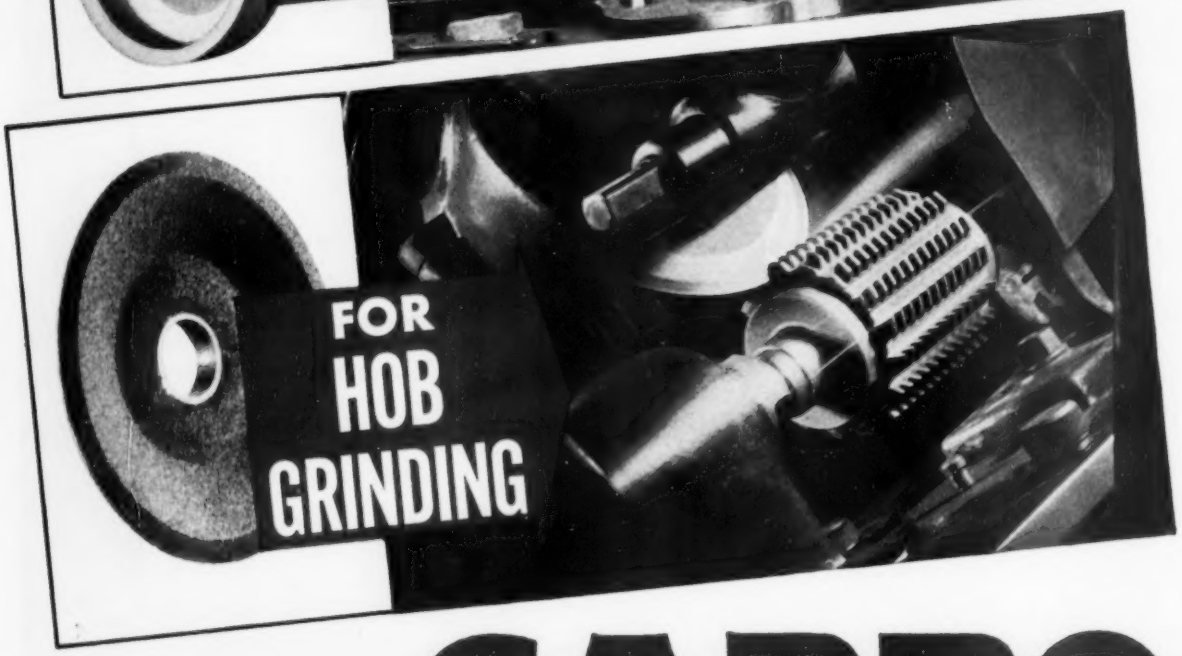
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY



The Warner & Swasey 5-Spindle Automatic line at the Yonkers Works of the Otis Elevator Company.

Tool room grinding





CARBO

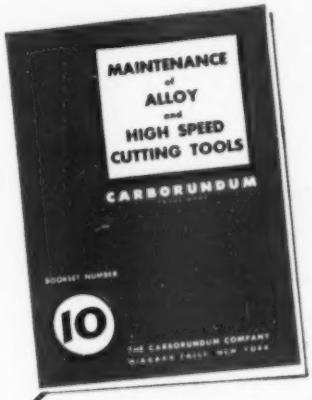
TRADE

"Carborundum", "Aloxite" and "Green-Grit" are trademarks of The Carborundum Company, Niagara Falls, New York

wheels...

Using the *right* wheel, from the complete line by CARBORUNDUM, for every tool room grinding job doesn't cost . . . it *pays*, and in a very short time. Here are some sample starting recommendations. Keep your high speed steel cutters sharp with ALOXITE aluminum oxide wheels in AA46-J6-V10 grading. For hobs and circular form tools, specify ALOXITE aluminum oxide DA70-H5-V20. Grind surfaces with ALOXITE aluminum oxide DA60-H9-V20; on hi-vanadium, hi-speed steel flats use "GREEN-GRIT" silicon carbide wheels—GC60-H11-VR for roughing, GC100-H5-VR for finishing. You'll find complete starting recommendations for all tool room applications in the booklet offered below.

CALL YOUR CARBORUNDUM DISTRIBUTOR TODAY. He carries complete stocks for prompt delivery of the right wheels for your jobs—and he'll keep you in touch with the latest developments in sound grinding practice. Phone him . . . he's listed under "Abrasives" in the yellow pages.



This "how-to" booklet is FREE!

THE CARBORUNDUM COMPANY, Dept. AM 81-35
Niagara Falls, New York

Please send me, FREE, your booklet No. 10, "Maintenance of Alloy and High Speed Cutting Tools."

NAME AND TITLE

COMPANY

STREET AND NUMBER

CITY ZONE STATE

RUNDUM

MARK

the ONLY source for EVERY abrasive product you need

81-35

A SINGLE-POINT CARBIDE TOOL is rough ground on a CRYSTOLON wheel. A typical job where these fast-cutting, cool-cutting silicon carbide wheels are proving their worth as cost-cutters.

Add this cost-cutting "TOUCH OF GOLD" to your carbide grinding...

Save your diamond wheels with Norton CRYSTOLON* wheels!

Conserving your diamond wheels during the present serious shortage of commercial diamonds is not only desirable, *it is vital*. Yes, and easy, too. Because:

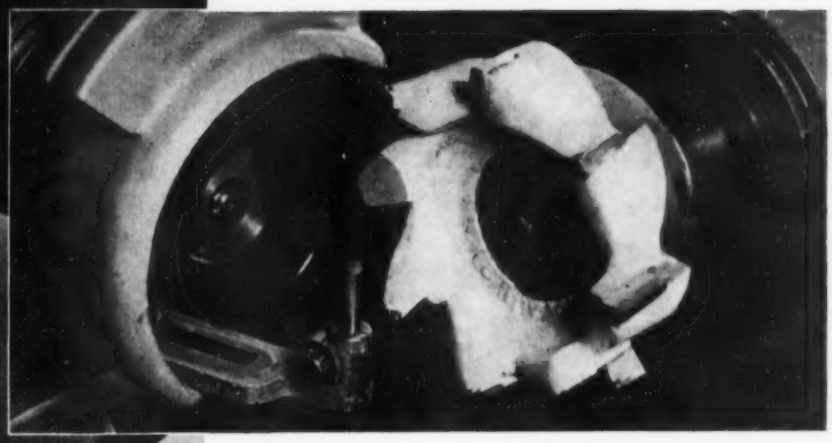
On many carbide grinding jobs Norton CRYSTOLON (silicon carbide) wheels will give you results equally as good as diamond wheels — plus big savings. In fact, the skillful teaming of Norton CRYSTOLON wheels *with* Norton diamond wheels assures you the true, value-adding "Touch of Gold" that means carbide tools at their very best.

Where CRYSTOLON Wheels Save

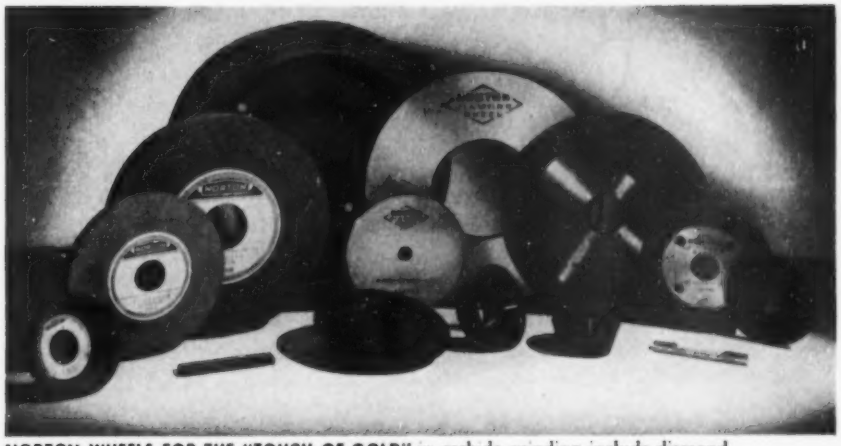
Recent tests in offhand grinding of single-point tools proved that the relatively slow wear of the diamond abrasive was more than offset by the much lower cost of the silicon carbide abrasive. Net result was that the silicon carbide wheels cost about ⅓ as much to use as the diamond wheels. And a 60 grit silicon carbide wheel gave as fine a finish as a 100 grit diamond wheel!

Many Other Savings

So it is with various other carbide grinding jobs, especially roughing, where you can replace costly diamond wheels with fast, free-cutting CRYSTOLON wheels. They are made in grit sizes up to



CARBIDE TIPS ON A FACE MILL get keen cutting edges on a Norton diamond wheel — the most efficient and economical wheel for multi-point tool grinding.



NORTON WHEELS FOR THE "TOUCH OF GOLD" in carbide grinding include diamond wheels in three bonds — vitrified, resinoid and metal — and CRYSTOLON wheels in two bonds — vitrified and resinoid.

200, resinoid bonded or in our new vitrified K-Bond — which is quality-controlled to produce half-grade increments of wheel hardness, enabling you to "pin-point" your exact specifications.

Of course, for grinding your multi-point carbide tools and similar jobs, you'll still want Norton diamond wheels in the correct bonds and grit sizes. But even here you may sometimes use CRYSTOLON wheels to advantage, especially on carbides used for machining cast iron.

See Your Norton Distributor

for practical aid in selecting the most economical Norton wheels — CRYSTOLON Abrasive or diamond abrasive — for your carbide grinding. That includes calling in your Norton Abrasive Engineer, if necessary, for advice on any tricky grinding problem. Backed by the world's largest manufacturers of abrasives, these Norton team-workers are ready to help you add the product-improving, money-saving "Touch of Gold" to every grinding job you do.

Get These Up-to-the-Minute Facts

Don't miss the December issue of *Grits and Grinds*, the Norton monthly magazine on grinding! It contains no less than three articles on carbide tool grinding by well-known Norton technicians. These expert analyses of the latest tested methods are packed with valuable information on how to cut your grinding costs and improve quality. Write us for your copy, also for these two other booklets on carbide grinding and how to make diamond wheels last longer. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

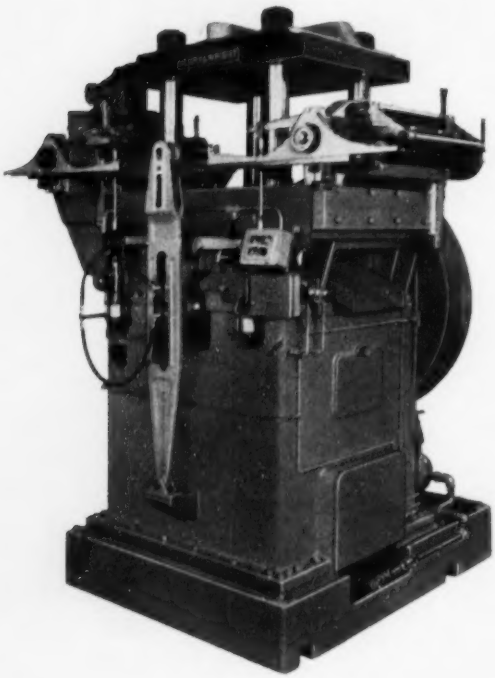
W-1465

NORTON

ABRASIVES

Making better products to make other products better

A PROFIT WITH EVERY STROKE



Our customers say that. It figures. One Dieing Machine does the work of five to ten conventional stamping presses. One stroke—a complete part. One inspection. One trip for parts removal. Speed—you can pull out the throttle. Die life—longer for two reasons. (1) Stability, minimum vibration, extreme precision of tools alignment. (2) Dies take less of a beating; less metal needs to be removed for sharpening. Our men can give you the whole Dieing Machine story. If you want to cut costs, now's the time to talk to one of them—a note from you will have an H & W man on deck promptly.

NEW CATALOG Up-to-the-minute facts on Dieing Machines. Capacities now range from 25 tons to 2500 tons. Catalog gives specifications up to 400-ton machine. Write Henry & Wright, 481 Windsor St., Hartford, Connecticut.

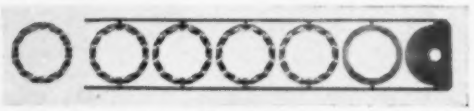
HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

HARTFORD 1, CONNECTICUT

TYPICAL JOBS THAT SHOW A PROFIT AT EVERY STROKE

Automotive stamping produced complete per stroke from 3/32" thick by 13" wide hot rolled steel in coils on 200-ton Dieing Machine, single gear type, equipped with progressive die. Speed approximately 45 strokes per minute.

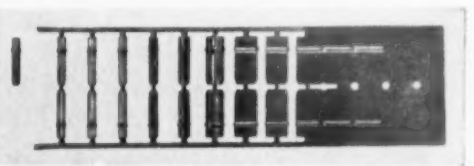


Ball bearing retainer produced complete in 75-ton Dieing Machine operating at speed of 95 strokes per minute. Made from 4⅜" wide by .034" thick cold rolled steel.

Ferrule. One completed piece produced per stroke in 50-ton Dieing Machine operating at speed of 90 strokes per minute. Made from 5/16" diameter by ⅞" long by .030" thick cold rolled steel.

C-Clamp Frame. Both halves produced complete in 150-ton Dieing Machine operating at speed of 65 strokes per minute. Material—cold rolled steel .086" by 4⅛" wide.

Support bracket produced complete one per stroke in 150-ton Dieing Machine operating at speed of 60 strokes per minute. Made from .062" thick by 7¼" wide cold rolled steel.



Radio tube prong produced complete in 25-ton Dieing Machine at rate of 450 pieces per minute. Made from brass .012" by 1 7/16" wide.

Bathroom fixture produced in 60-ton Dieing Machine operating at speed of 100 strokes per minute. Made from .032" thick by 1¾" wide cold rolled steel.

Hardware item. One completed piece produced per stroke in 100-ton Dieing Machine operating at speed of 75 strokes per minute. Made from 3" wide by .040" thick cold rolled steel.

They wouldn't believe it either

— until they SAW it!

Seeing was believing for a group of mechanical officials from one of the mid-west's ... earth moving equipment builders.

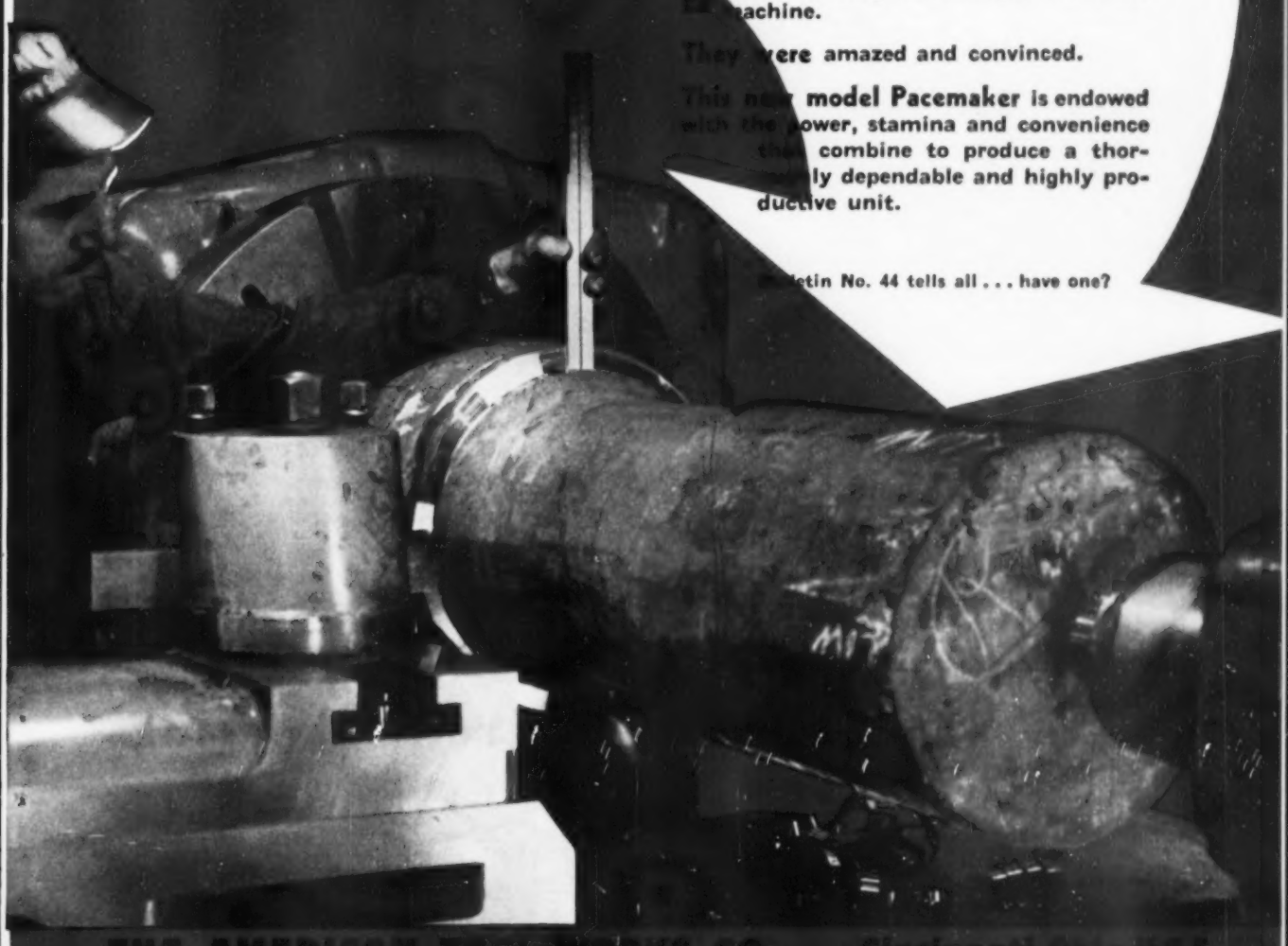
Frankly they just wouldn't believe that the new 32" "AMERICAN" ... maker Lathe would effectively use 60 horse power and cemented carbide cutting tools ... machining rough and tough alloy steel forgings. So they came to see for themselves and they saw:

1. Cuts 1⅜" deep.
2. Cutting speed 300 feet per minute.
3. .030" feed.
4. 60 horse power registered by horse power meter during the maximum cuts.
5. Not a shimmy or whimper from the machine.

They were amazed and convinced.

This new **model Pacemaker** is endowed with the power, stamina and convenience that combine to produce a thoroughly dependable and highly productive unit.

...tin No. 44 tells all . . . have one?

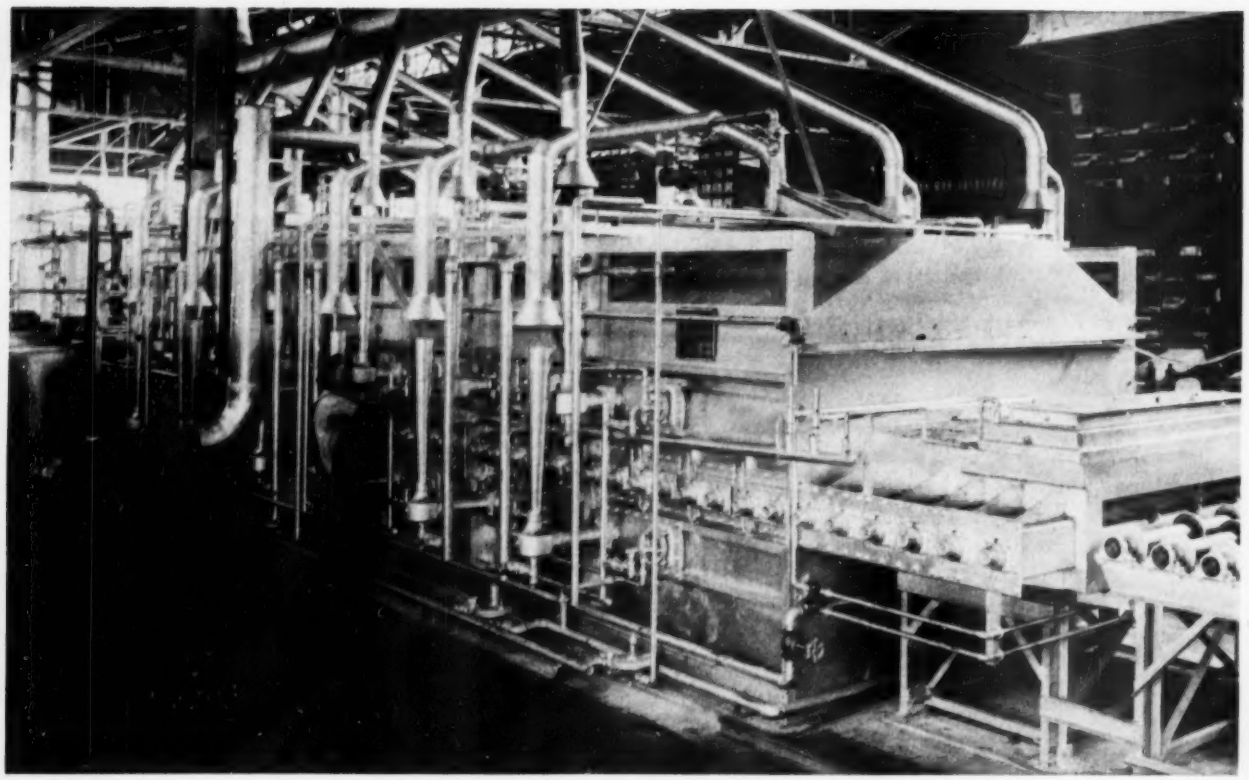


THE AMERICAN TOOL WORKS CO. Cincinnati, O. U.S.A.

LATHES AND RADIAL DRILLS

LINK-BELT ball and

keep company with America's

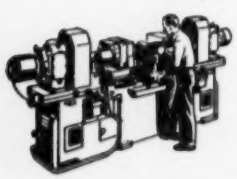


YOU can always count on top performance when you specify Link-Belt precision bearings. For Link-Belt's Sealed-Housing feature assures longer bearing life plus extended lubricating schedules. And Link-Belt alone offers this vital feature in *both* ball and roller models.

With this exclusive advantage, all moving surfaces are completely enclosed and lubricated from a large, common reservoir. Grease stays in, dirt stays out . . . and wear is minimized even under grueling operating conditions.

Link-Belt's experienced engineers will be glad to help you in your bearing application problems . . . with no obligation, of course. Or you may get full information from Data Book 2550.

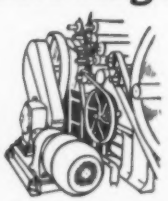
LINK-BELT ball and roller bearings



Metal Working Machinery

Farm Machinery

Construction Equipment



Textile Machines

roller bearings
hardest-working machines

Automotive parts are annealed by one of the big auto-makers in this continuous roller hearth radiant tube-fired furnace built by Surface Combustion Corp., Toledo, Ohio. As on many of their other furnaces, Link-Belt ball and roller bearing pillow blocks and flanged blocks are used to withstand the demands of high temperatures and continuous operation.

Universally aligning. Capacity for radial and thrust loads.
Wide inner ring distributes load over large shaft area.
Lubrication fitting with pressure relief feature prevents excessive grease pressure.
Self-aligning seals effectively keep grease in and dirt out, regardless of alignment.
Spring-locking collar with set-screw clamps bearing firmly on shaft.
Lubricant passes freely into large reservoir to lubricate moving surfaces.
Easily installed by slipping bearing onto shaft and clamping inner ring by tightening two set-screws in spring locking collar.
Sturdy, compact cast housing requires minimum support space, can be positioned on the side of a machine.

Cutaway of Series 200 Ball Bearing Flanged Block — part of Link-Belt's line of Pillow Blocks, Flanged, Flanged Cartridge, Cartridge, Hanger, Take-up Blocks and unmounted Bearings.

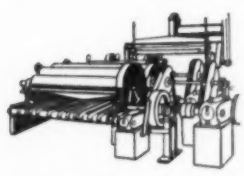
LINK-BELT

BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Plants: Indianapolis, Chicago, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.

13,098

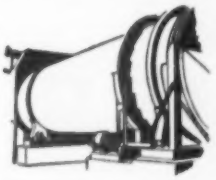
smooth the path of power for all industry



Pulp & Paper Machinery

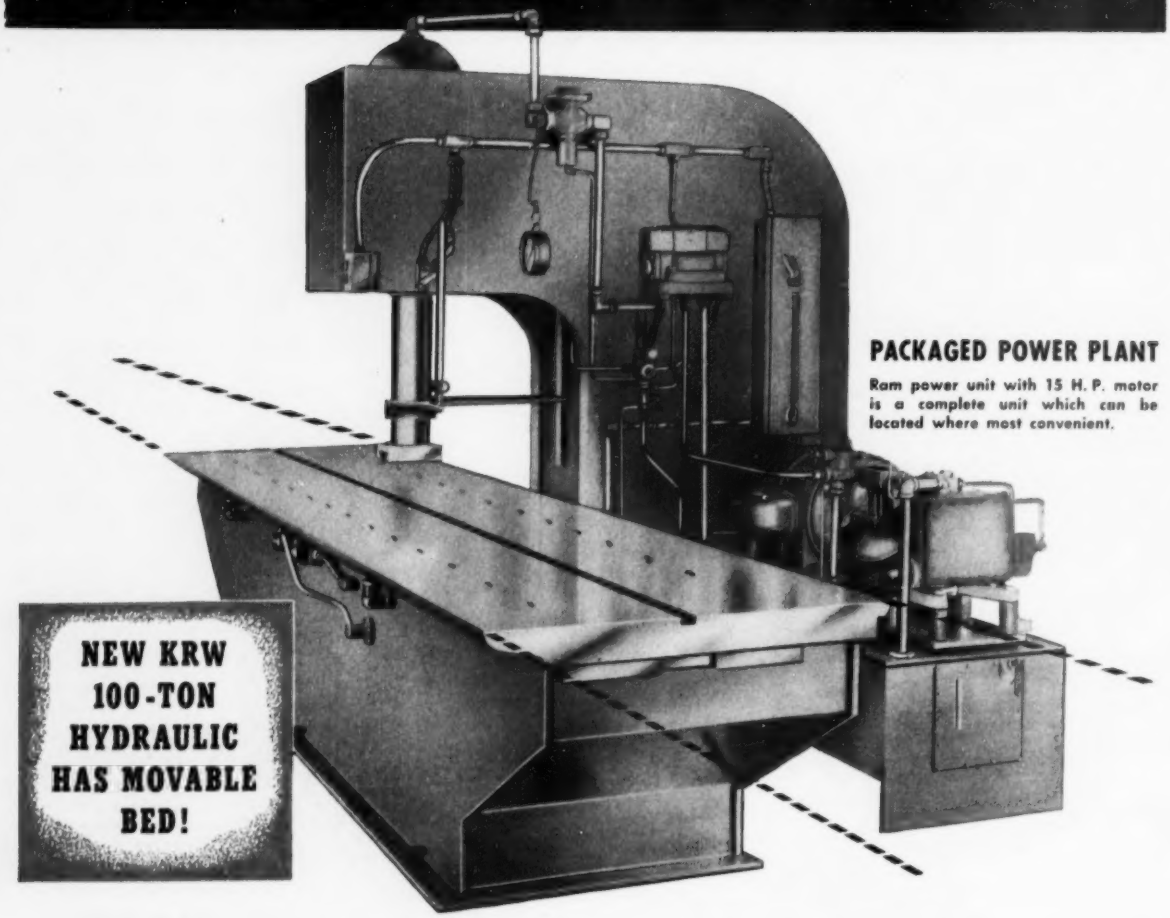
Materials Handling Equipment

Oil Field Equipment



Processing Equipment

NEW PRESS BRINGS THE WORK TO YOU!



NEW KRW 100-TON HYDRAULIC HAS MOVABLE BED!

PACKAGED POWER PLANT

Ram power unit with 15 H. P. motor is a complete unit which can be located where most convenient.

Here's KRW's newest time-saver! It's a 100-ton Hydraulic Press with an extra-long 16 foot bed that moves more than 3 feet in either direction. Now being used for important straightening work by some of America's largest manufacturers of airplane forgings. Due to the extra-long movable bed, straightening work on large pieces can be accomplished with greater facility and speed. Ideal for manufacturers and fabricators of extra-long parts that require straightening work. Press bed has independent motor drive. Hydraulic motor doesn't have to be running to move the press bed back and forth.

This new KRW press has a unique load-control feature. An applied ram load can be maintained at any pressure setting from 10 to 100 tons without holding manually controlled lever at applied position. Operator can bring ram load to desired tonnage and remove hand from control lever. Lever automatically returns to neutral but applied load will be retained until manually controlled lever is moved to reverse position for lifting ram. This feature saves time on straightening jobs where it is necessary to hold a given pressure for periods of time.

KRW also makes a full line of one, two and three cylinder Hydraulic Presses; hand, air or motor driven; 25-150 ton capacities. Write for details and prices on this or any KRW Hydraulic to Dep't. 11.

SPECIFICATIONS

CONSTRUCTION Cylinder—chrome-nickel-molybdenum steel; C-frame and bed, weldment fabrication; Table, steel.

TABLE CONTROL Separate push buttons for right and left movement. Table stops when manually applied push button is released.

SAFETY PROVISIONS Electrical System—disconnect switches, automatic and manual.

Hydraulic System—pressure relief valves eliminate danger of overload in any part of the Hydraulic circuit.

Table and Ram travel is limited by safety switches. Manually adjustable stop limits up-travel of ram.

K·R·WILSON

215 MAIN ST., BUFFALO 3, N. Y.

Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

Presenting a

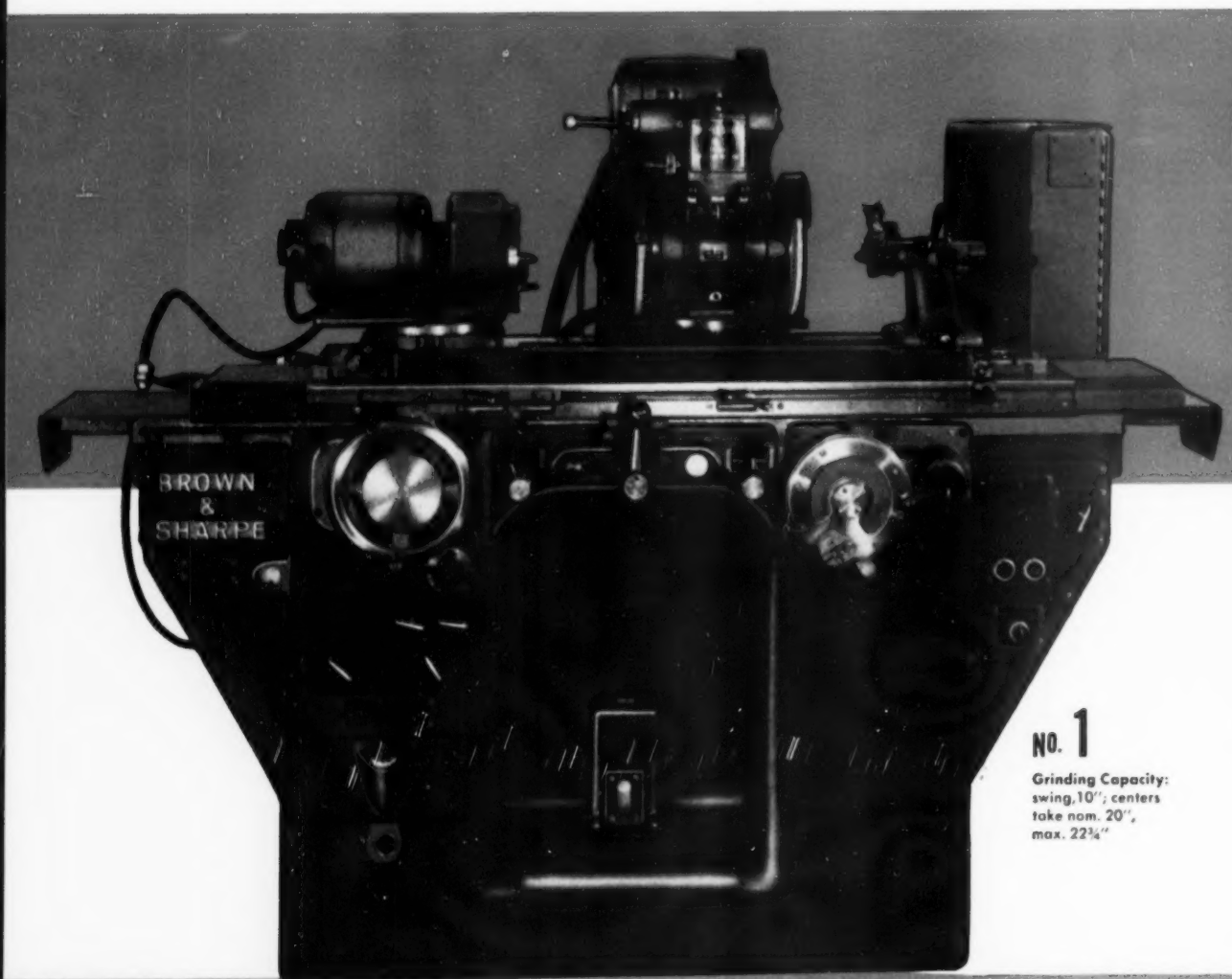
COMPLETELY NEW LINE

of Universal Grinding Machines

Brown & Sharpe

B·S

4 Completely New...

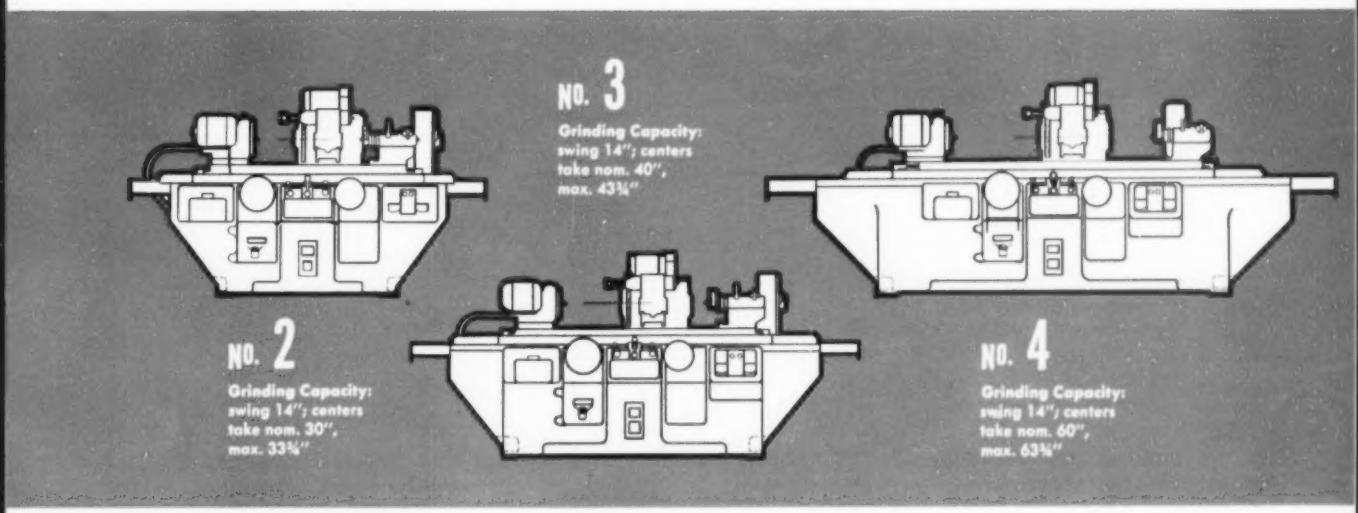


NO. 1

Grinding Capacity:
swing, 10"; centers
take nom. 20",
max. 22¾"

Universal Grinding Machines

Productioneered to handle the widest variety of precision work at production speeds

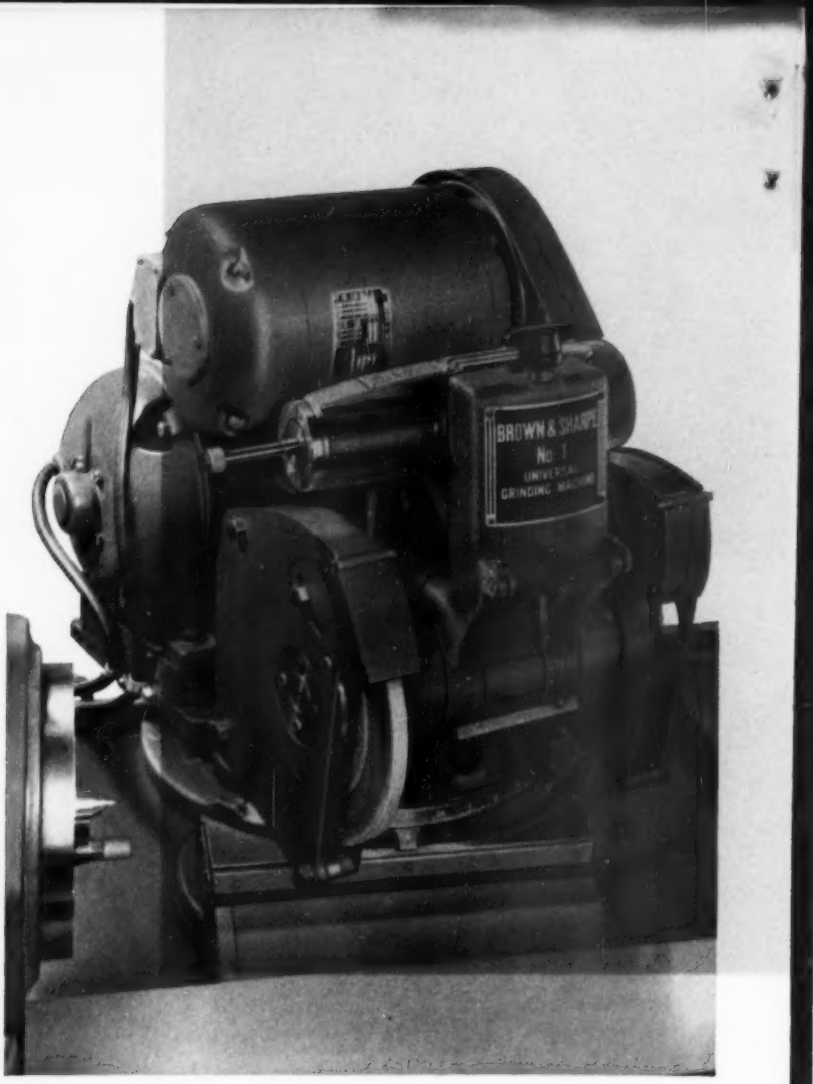

No. 3
Grinding Capacity: swing 14"; centers take nom. 40", max. 43¾"
No. 2
Grinding Capacity: swing 14"; centers take nom. 30", max. 33¾"
No. 4
Grinding Capacity: swing 14"; centers take nom. 60", max. 63¾"

This entirely new line of Brown & Sharpe Universal Grinding Machines bridges the long-existing gap between conventional universal and single-purpose grinding machines. Years of extensive research and development . . . the combined talents of Brown & Sharpe engineers and craftsmen . . . have been employed to bring you this ultra-modern group of new Universal Grinding Machines. Their many new and exclusive features provide exceptional grinding flexibility, rigidity, and accuracy. Instant combining of operating functions into automatic cycles extends the usefulness of this equipment beyond the toolroom and job shop, to many production applications.

Compare these new Brown & Sharpe Universal Grinding Machines feature for feature . . . see the following page.

Brown & Sharpe B·S

Compare all these *productioneered* features



- **Completely Universal Wheel Spindle Unit**

  Design of wheel spindle unit permits either the external grinding spindle or the internal grinding spindle to be used in any desired horizontal position. Accurate compound settings can be made for combination straight and taper, or double taper grinding (both external and internal) with only one set-up.

- Removable Unit Type External Grinding Spindle
- Greater Flexibility of Grinding Speeds
- Instantly Available Internal Grinding Spindle, Independently Driven
- Hydraulic Table Drive Maintains Smooth, Constant Table Movement
- Variable Speed Headstock
- Table Throttle Permits Exact Repetition of Truing and Grinding Speeds
- Unique Universal Turret Provides Extra Work Capacity
- Faster, More Accurate Sizing
- Positive Stop on Cross Feed for Both External and Internal Grinding
- Built to Meet J.I.C. Electrical and Hydraulic Standards
- Additional Automatic Functions Available to Increase Productive Flexibility

Get complete specifications on these new ultra-modern Universal Grinding Machines and their diversified equipment — write for illustrated Bulletins.

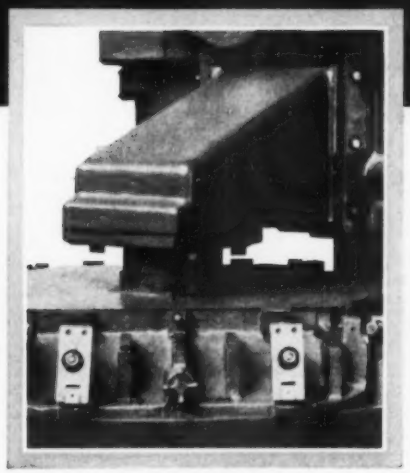
Brown & Sharpe

Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories
Machinists' Tools • Electronic Measuring Equipment • Johansson Gage Blocks • Permanent Magnet Chucks • Pumps

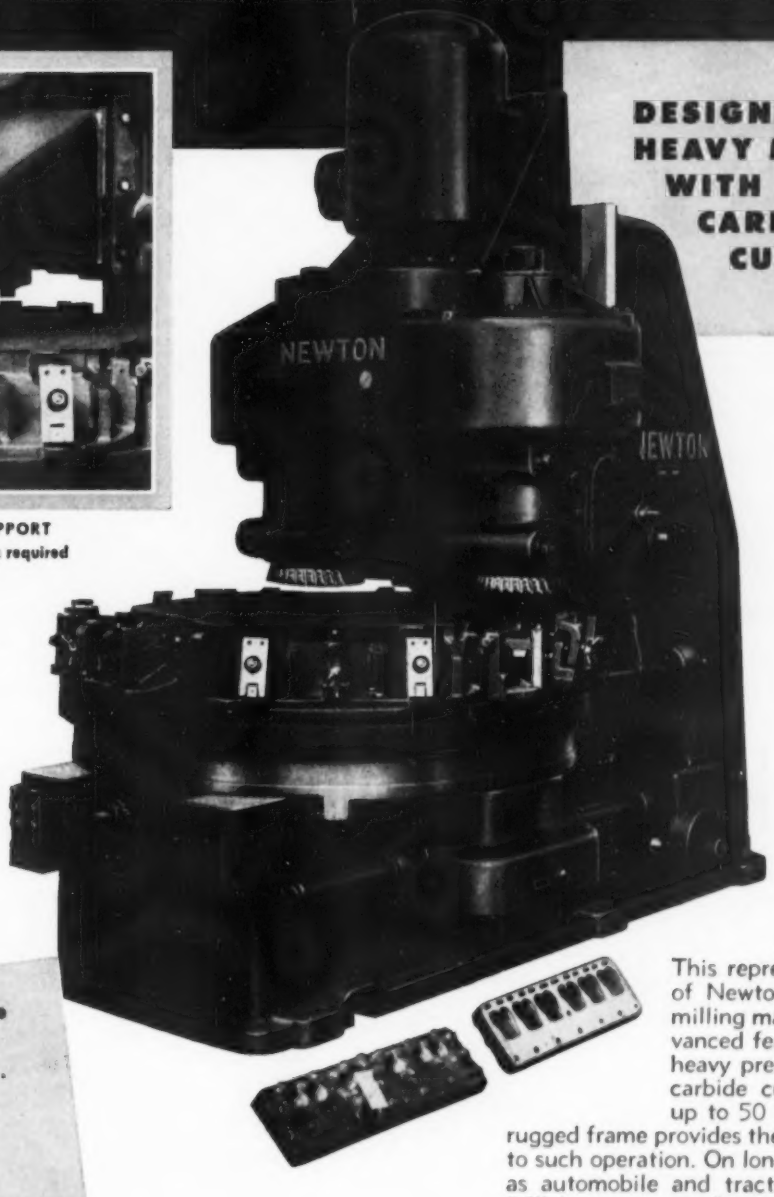
BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.

PRINTED IN U.S.A.

NEWTON VERTICAL SPINDLE ROTARY CONTINUOUS MILLING MACHINES



CENTER SUPPORT
Furnished when required



DESIGNED FOR HEAVY MILLING WITH CARBIDE CUTTERS

This representative example of Newton high production milling machines has the advanced features required for heavy precision milling with carbide cutters and motors up to 50 H.P. An unusually rugged frame provides the rigidity necessary to such operation. On long work pieces such as automobile and tractor cylinder heads, 36" between spindles makes possible the completion of the roughing cut before the finishing cut starts. Independent pick-off gears for each spindle provide the means for correct cutting speeds for both roughing and finishing cuts. Heavy flywheels, solidly attached to each spindle, insure maximum cutter life between grinds. Intermittent feed—rapid traverse attachment and center support are optional. Two standard table sizes. Other table sizes and spindle center distances are available. Newton Milling Machines, applicable to your precision milling problems, will help to step up your production and reduce your costs. Complete information will be furnished upon request.

Among Heavy Machine Tools built by Consolidated are . . . .

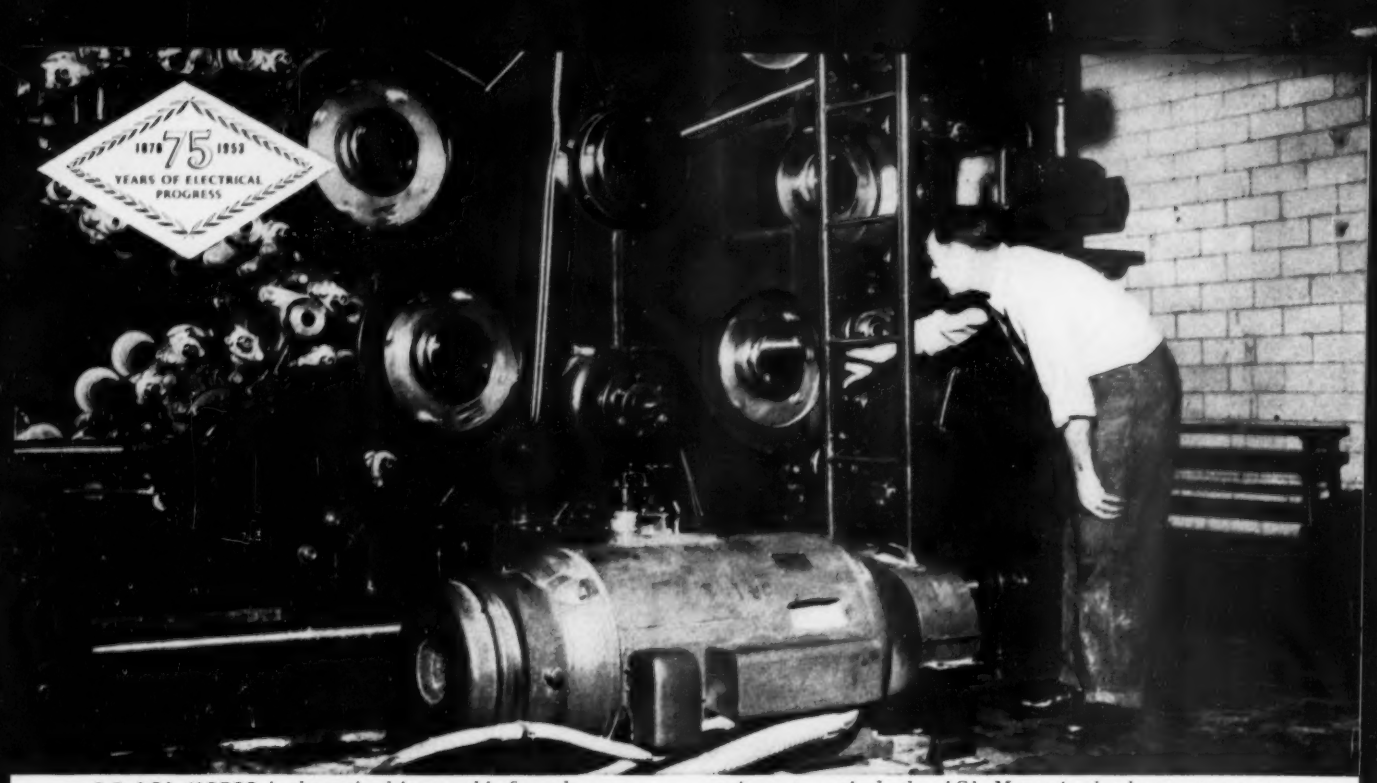
LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

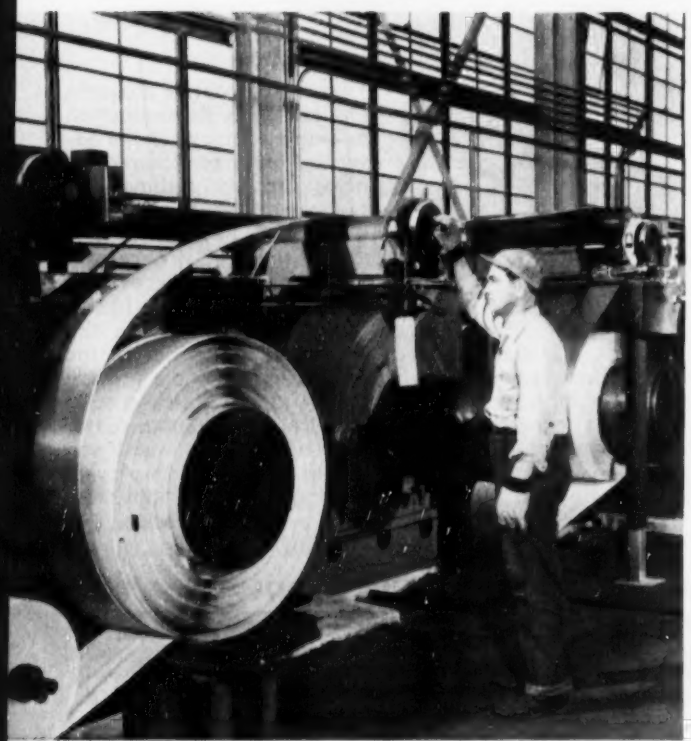
CONSOLIDATED
MACHINE TOOL CORPORATION

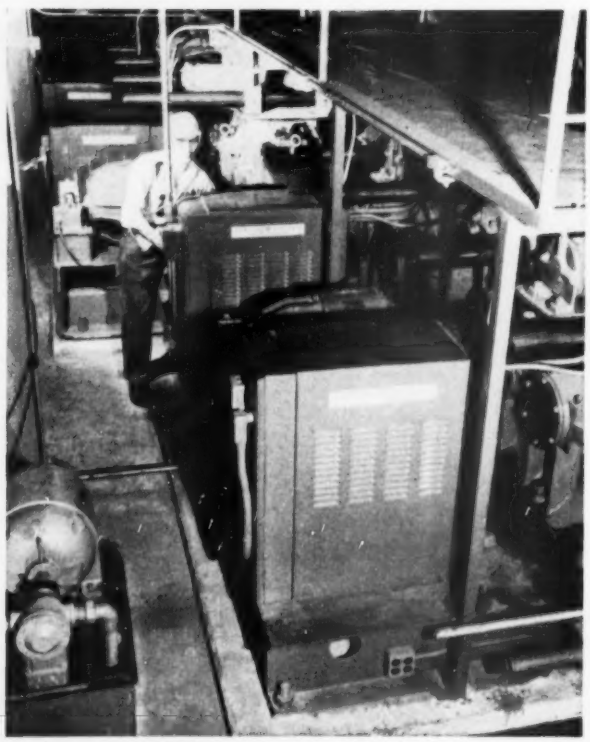
SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED
ROCHESTER, NEW YORK



G-E ACA MOTOR is the main drive on this five-color press at Alford Cartons, manufacturers of folding boxes, Ridgefield Park, New Jersey. Working from AC current with no conversion equipment required, the ACA Motor is the low cost way to Adjustable-speed Drive performance. You get stepless speed adjustment within a speed range of from 3 to 1, 6 to 1, and 20 to 1.

Make your machinery more versatile





G-E SPEED VARIATOR boosts winders "spooling" chrome strip steel at Wallingford Steel Co., Wallingford, Conn.—handles all speeds from 5 to 80 feet per minute. G-E Speed Variators, with speed ranges up to 40 to 1, are complete "package" units—available in ratings from 1 to 200 hp. For even greater accuracy and versatility, these drives may include amplidyne or electronic regulators.

G-E THY-MO-TROL® DRIVE at the El-Ge Potato Chip Co., York, Pa., electronically regulates potato chip processing where accurate speed control is extremely important to the finished product. Thy-mo-trol drive is available between 1/40 and 75 hp, offers smooth speed adjustment ranging up to 100 to 1 and can be made to hold regulation as close as ±½% regardless of changes in voltage.

with a G-E Adjustable-speed Drive!

G-E ADJUSTABLE-SPEED DRIVES offer you the chance to get the most from your machinery investment. You can step up production, minimize material waste, improve product quality, and enjoy the ability to produce a greater variety of goods.

THERE IS A G-E ADJUSTABLE-SPEED DRIVE FOR YOU. Whether you need speed regulation within ±½% or ±10% you can get an economical Adjustable-speed Drive from the full G-E line. From the G-E ACA motor which requires but a simple twist of a dial . . . to the G-E Thy-mo-trol drive which permits precise electronically controlled drive speeds . . . General Electric manufactures a drive that will enable you to produce better and more uniform products. Packaged drives are available in sizes from 1/40 to 200 hp. Depending on hp, speed ranges are available from 3 to 1 up to 100 to 1.

FOR FULL INFORMATION consult your nearest General Electric Apparatus Sales Office. Your G-E Sales Representative will be glad to recommend the most economical drive best suited to your operation. For printed information on the complete line of Adjustable-speed Drives, use the coupon.

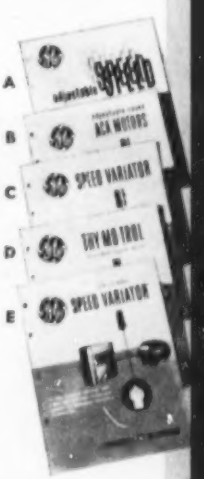
*Reg. Trademark of General Electric Company

You can put your confidence in—

GENERAL ELECTRIC

LET G.E. HELP YOU PICK THE RIGHT DRIVE

Because only General Electric makes all major types of electric adjustable-speed drives, it is best qualified to help you select the right drive. Send for these informative bulletins.



☐ A. This 26-page manual describes all four types of drives and where to apply them. Bulletin GEA-5334.

☐ B. Lower cost, simplest a-c drive. Bulletin GEA-4883.

☐ C. More flexibility, moderate cost. Bulletin GEA-5335.

☐ D. Top performance, 1/70—75 hp. Bulletin GEA-5337.

☐ E. Top performance, 1–200 hp. Bulletin GEA-5336.

General Electric Company
Section F 646-20
Schenectady 5, N. Y.

Please send me the bulletins checked
☐ for reference only
☐ for planning an immediate project

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another reason why more threading shops say—

"we've standardized on VERS-O-TOOL"

You probably know Vers-o-tools as the self-opening, precision die heads that feature the circular-ground thread type of chaser—

- **the kind that give as many as 200 grinds.**
- **the kind that are micrometer gauge checked on their blocks before and after each grind, so that the first piece cut will be right—no removal of head, no fussing to get size, no scrap.**

Vers-o-tools are the most versatile tools, produce more per dollar of investment—cost less. That's why so many experienced users say, "We've standardized."

How about the shorter runs?
Simply substitute the Adjustable Blade Chasers and Blocks for circulars in the same Vers-o-tool head. They also have ground threads and the cost is less.

Hollow Milling?
End forming and turning cutters, both circular and blade-types, cut three times faster than single point tools, snap open and leave no marks, also knurls and burnishing rolls.

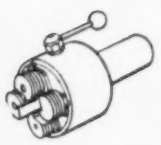
Interchangeable?
All chasers, mills or rolls, circular or blade-type, are, with their blocks, used in both revolving and non-revolving Vers-o-tools, die size for size.

DT-52 is the complete new catalog on Vers-o-tools and Namco Solid and Collapsible Taps.

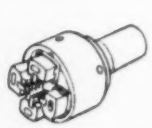
Time Saving ... that's it!

Change chasers in less than 2 minutes—just lift reset handle, slide back the hood and they drop out—no screws, no adjustments, patented.

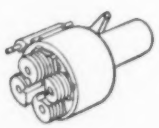
Time saving—that's it! . . . And that's one big reason why makers of smooth class 3 high pressure threads whose 'round-the-clock schedules often run into millions of a kind STANDARDIZE on Namco Vers-o-tools.



Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, ⅛"—6½".



Style DR Vers-o-tool (Revolving Type) 13 Sizes 1/16"—6½" Shown with Adjustable Blade Chasers 7 Sizes, ⅛"—2".

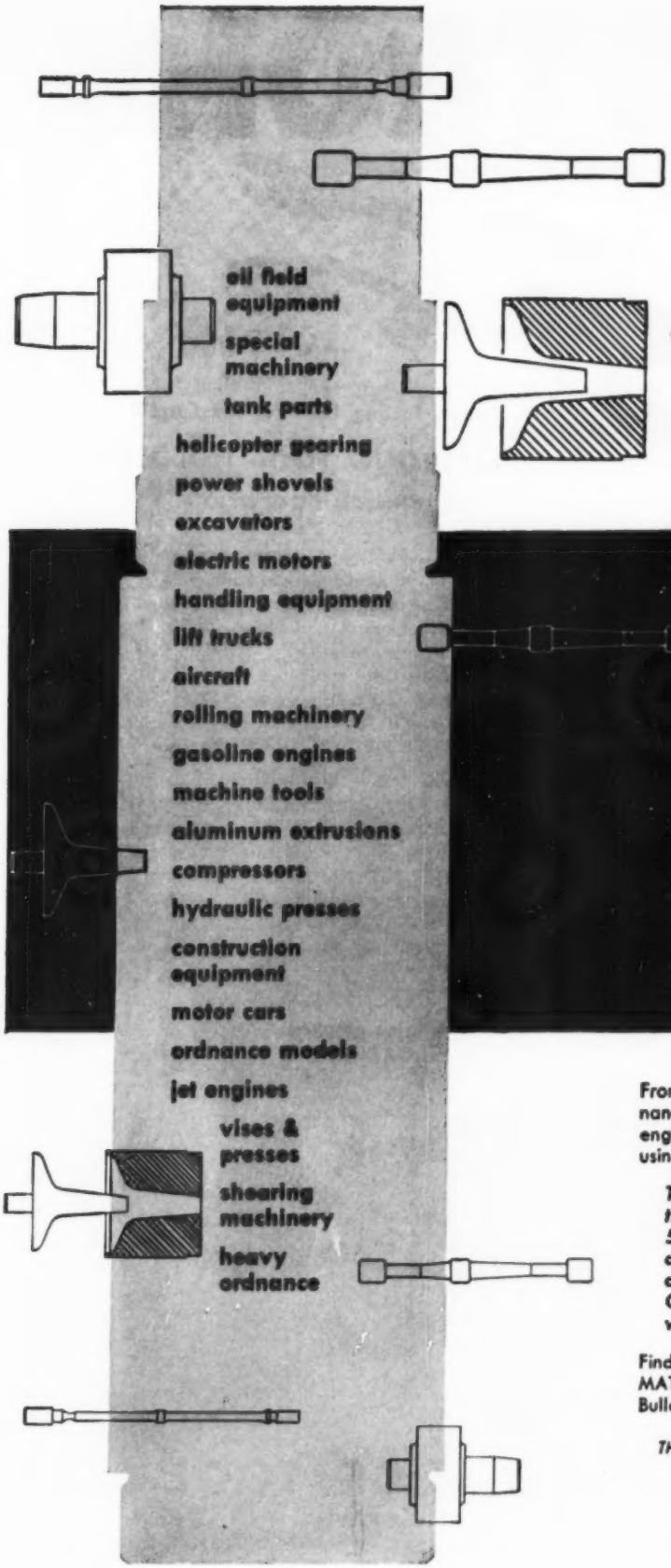


Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, ¼"—1/2".

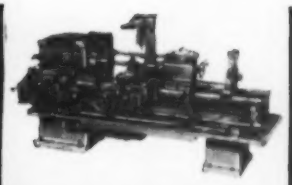
24-HOUR DELIVERIES ON MOST STANDARD STOCKABLE NC AND NF CHASERS AND BLOCKS—ALSO NATIONAL TAPER PIPE AND DRY SEAL

The NATIONAL ACME CO.
170 EAST 131 STREET, CLEVELAND 8, OHIO.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.



industry cross-section agrees...



Lodge & Shipley COPYMATICS

SAVE time... cost, capital investment, space... manpower

From mammouth construction equipment to ordnance models, from small gasoline motors to jet engines... manufacturers report significant savings using the COPYMATIC.

Time savings run from 22% up to 87%. Production increases from over 100% to as much as 536%! Cost savings range from 40% to an amazing $14,000 in one year. Capital, space and manpower savings are revealed by one COPYMATIC replacing 3 older lathes in one well-known plant.

Find out how much a Lodge & Shipley COPYMATIC can save you. Ask for case histories and Bulletin #675.

THE **Lodge & Shipley** COMPANY

3059 COLERAIN

CINCINNATI 25, OHIO

ARMSTRONG

Modern Tooling Calls for *the Correct*

ARMSTRONG TOOL HOLDERS for each operation

In the old days it was a matter of pride with toolmakers to be able to do the work at hand with the tools at hand. It's a credit to their skill that they could devise to cut threads, do cutting-off and facing, as well as many other operations with one ARMSTRONG TURNING TOOL, but, at today's labor cost, this would be an expensive practice. The maximum of productive work and true machining efficiency can only be obtained by providing the correct ARMSTRONG TOOL HOLDERS for each operation.

The Armstrong System of Tool Holders provides specially designed ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters, and shapers . . . Turning Tools, Boring Tools, Threading Tools, Knurling Tools, Cutting-Off Tools; tool holders with straight shanks, with off-set shanks, rigid tools and "spring" tools . . . special tool holders for high speed steel bits or blades, for ARMIDE (carbide-tipped) Cutters, for ARMALOY (cast alloy) Bits and Blades.

These modern efficient ARMSTRONG TOOL HOLDERS are as available as your telephone for they are carried in stock by your local ARMSTRONG Distributor.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

5215 W. ARMSTRONG AVENUE **CHICAGO 30, ILL.**

HARDINGE
ELMIRA, N.Y.

FEATURES...

Infinite Control of Speed and Feed

Tool Room and Production Lathe

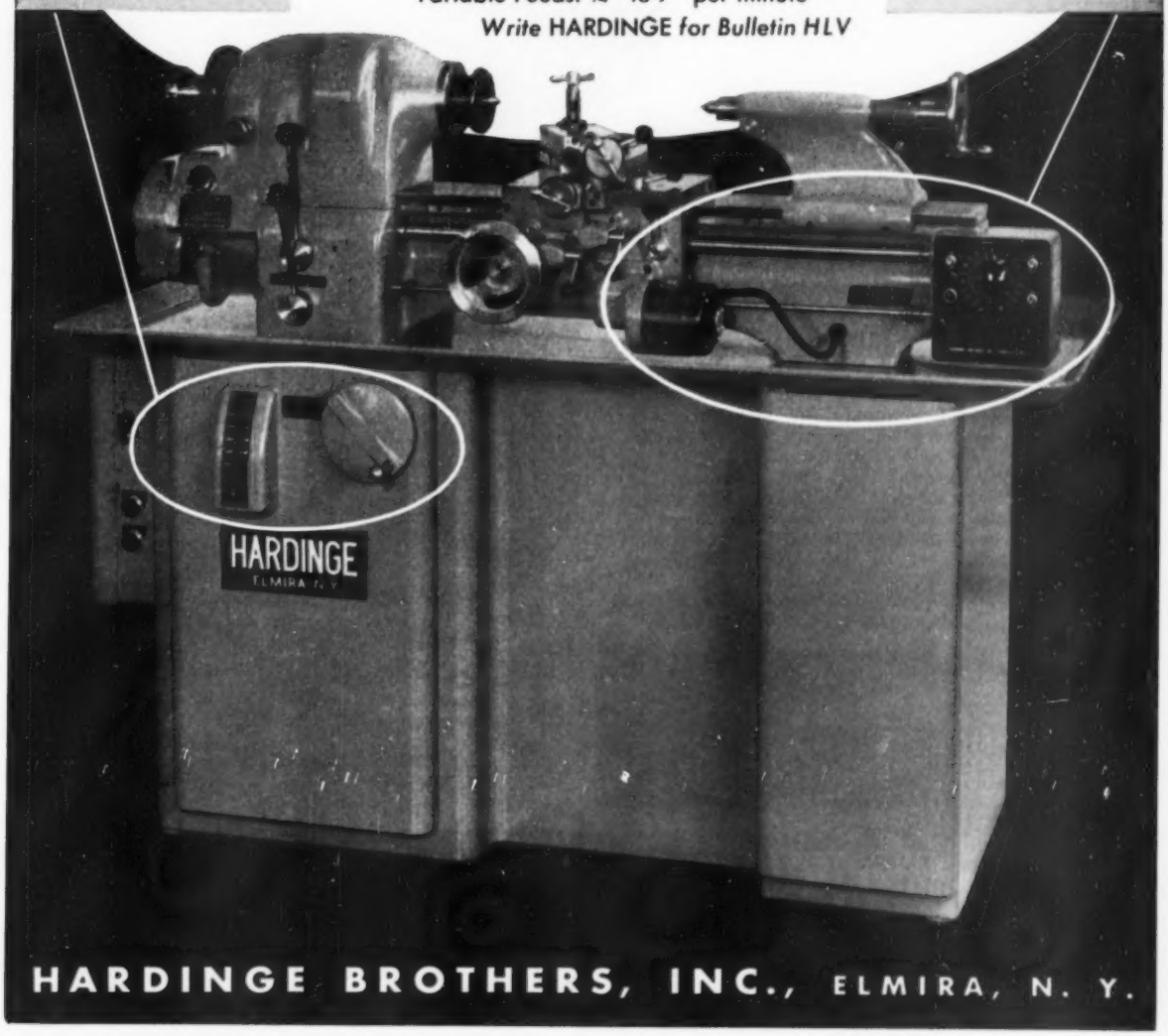
Variable Speed Drive for Headstock Spindle

Both drives are independent and infinitely variable to secure every possible combination of speeds and feeds within the following range:

Variable Speeds: 125 to 3000 r.p.m.
Variable Feeds: ¼" to 7" per minute

Write HARDINGE *for Bulletin HLV*

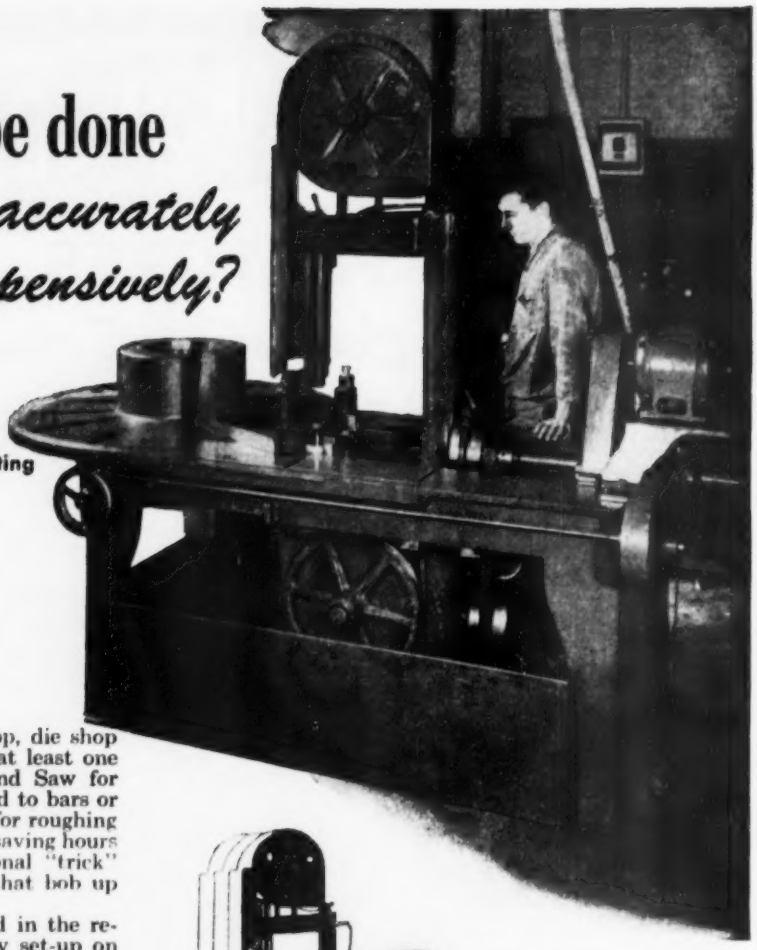
Variable Feed Drive for Carriage and Cross Slide



HARDINGE BROTHERS, INC., ELMIRA, N. Y.

How else could this job be done

so easily, so accurately and so inexpensively?

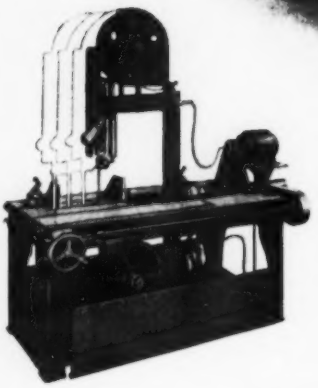


Segmentation of 42" Steel Casting

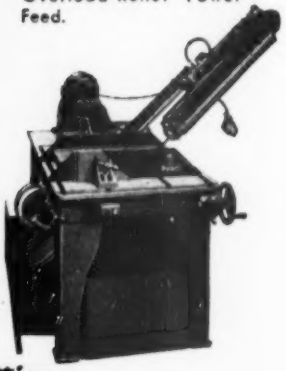
Every tool room, machine shop, die shop and maintenance department needs at least one No. 8 MARVEL Metal-cutting Band Saw for cutting off anything from ⅛" drill rod to bars or billets of 18" x 18" cross-section . . . for roughing large work to size and shape, thereby saving hours of machining . . . for those occasional "trick" jobs, impossible on any other saw, that bob up in every plant.

Odd shapes that can't be held in the removable, quick-action vise, are easily set-up on the No. 8's large, T-slotted work table. MARVEL Overload-Relief Power Feed insures accurate cuts under the most adverse conditions because blade pressures are automatically held within limits which are pre-set instantly for each job. The blade is never forced beyond its capacity to efficiently and accurately remove metal . . .

Close limits are further assured through the work being clamped rigidly to the bed of the saw and the blade power-fed through it instead of pushing the work through the blade. This is also true in miter cutting, as the blade column—*not the work*—is swung to the required angle. The handiest, most versatile machine tool, it is also the busiest in most shops.



This double exposure illustrates how the blade maintains its vertical position while moving into and through the work, impelled by the automatic MARVEL Overload-Relief Power Feed.



Column set at angle to cut 45° miter on 18" beam. Entire saw column can be swung to cut at any angle from vertical to 45° right or 45° left.

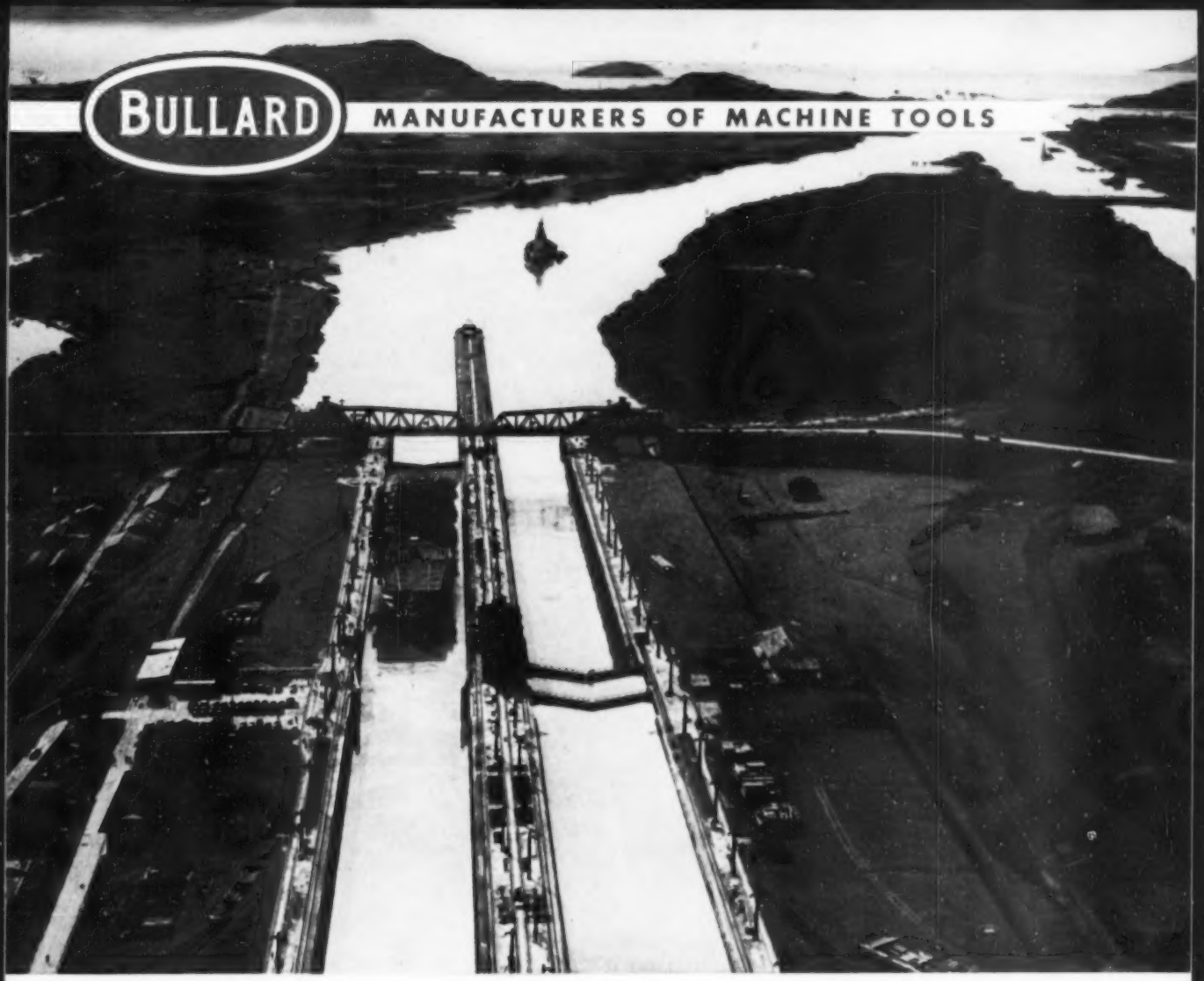
MARVEL *Metal Cutting* **SAWS**

Better Machines–Better Blades

Write for Catalog

ARMSTRONG-BLUM MANUFACTURING CO.

5700 Bloomingdale Avenue *"The Hack Saw People"* **Chicago 39, U. S. A.**



Panama Canal, Pedro Miguel Locks

United Press Acme Photo

The Invisible Background of Industrial Progress

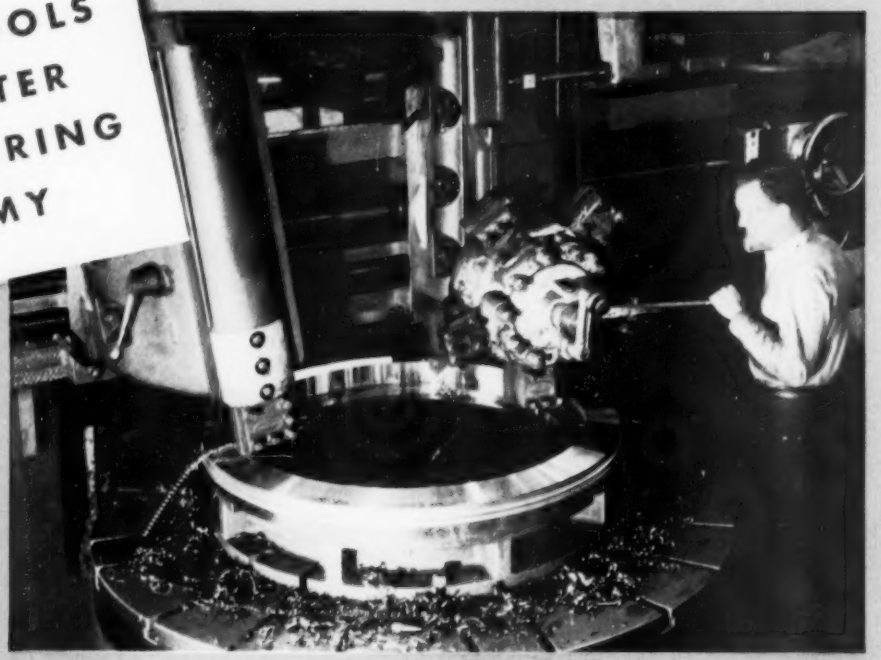
Panama Canal, a United States acquisition about 1904, was officially opened July 12, 1920. The total cost to our country was $375,000,000. Earth removed was 239,000,000 yards. However, American ingenuity, incentive and industrial progress through Machine Tools and the practical use of mechanical equipment — such as: plows, derricks, stonecutters, drills, shovels, steamboats, dredges, pile drivers, tracklayers, locomotives, steam shovels and other products of mechanical ingenuity realized a 400-year-old dream of a passage between North and South America. In 1949 almost 10,000,000 tons of shipping passed through the Canal from east to west, and from west to east approximately 15,500,000 tons. Statistics show the distance saved between New York and San Francisco is nearly 8,000 miles with only a matter of six to eight hours for a vessel to make the passage. Ships of 1,000 feet in length are accommodated in any of the five locks in the Canal. ★ Today because of *Modern Machine Tools* and mechanical equipment such projects consume considerably less time than "The Big Ditch".

★ *For greater manufacturing economy REFER to next page.*

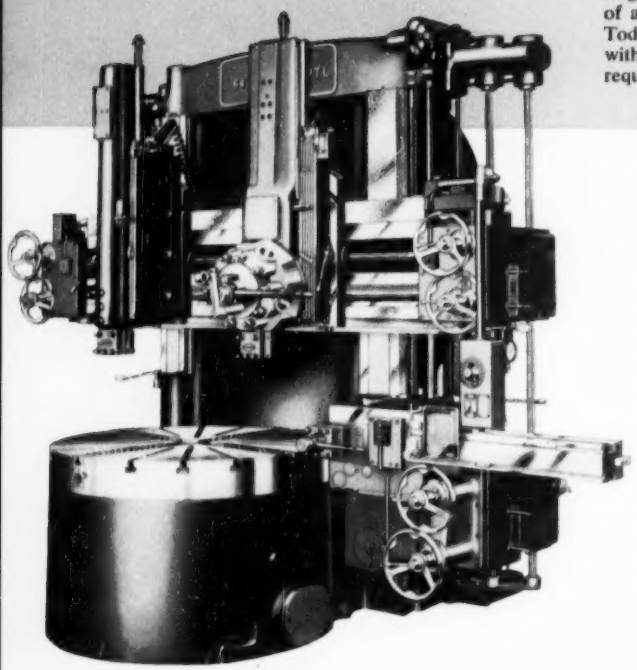
THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

BULLARD MACHINE TOOLS FOR GREATER MANUFACTURING ECONOMY



In the background of "Industrial Progress" lies the development of the name Vertical Turret Lathe. This name, an offshoot from the old single-head boring machine, was established in 1909 by the inception of a vertical boring mill having a sidehead, which Bullard pioneered. Today the modern conception is the Cut Master Vertical Turret Lathe with its design and engineering in keeping with manufacturing requirements.



The Cut Master is exactly, in all respects, what its name implies — accurate and efficiently productive. Truly a machine for manufacturing economy. These machines are widely reputed to be of great adaptability on almost all classes of work. Bullard Machines of this type, because of their wide range of sizes, are ideally suited for installation aboard many of the United States ships of defense for their maintenance requirements. Furthermore, Bullard Machines are used in the industries which manufacture for the large construction projects where the accuracy of the finished product determines its reliability for the functions required. Original machining accuracy of work assures reliability with minimum maintenance costs over long periods. Bullard Cut Master Vertical Turret Lathes give assurance to your customer that the product bearing your name is of the highest quality.

BULLARD

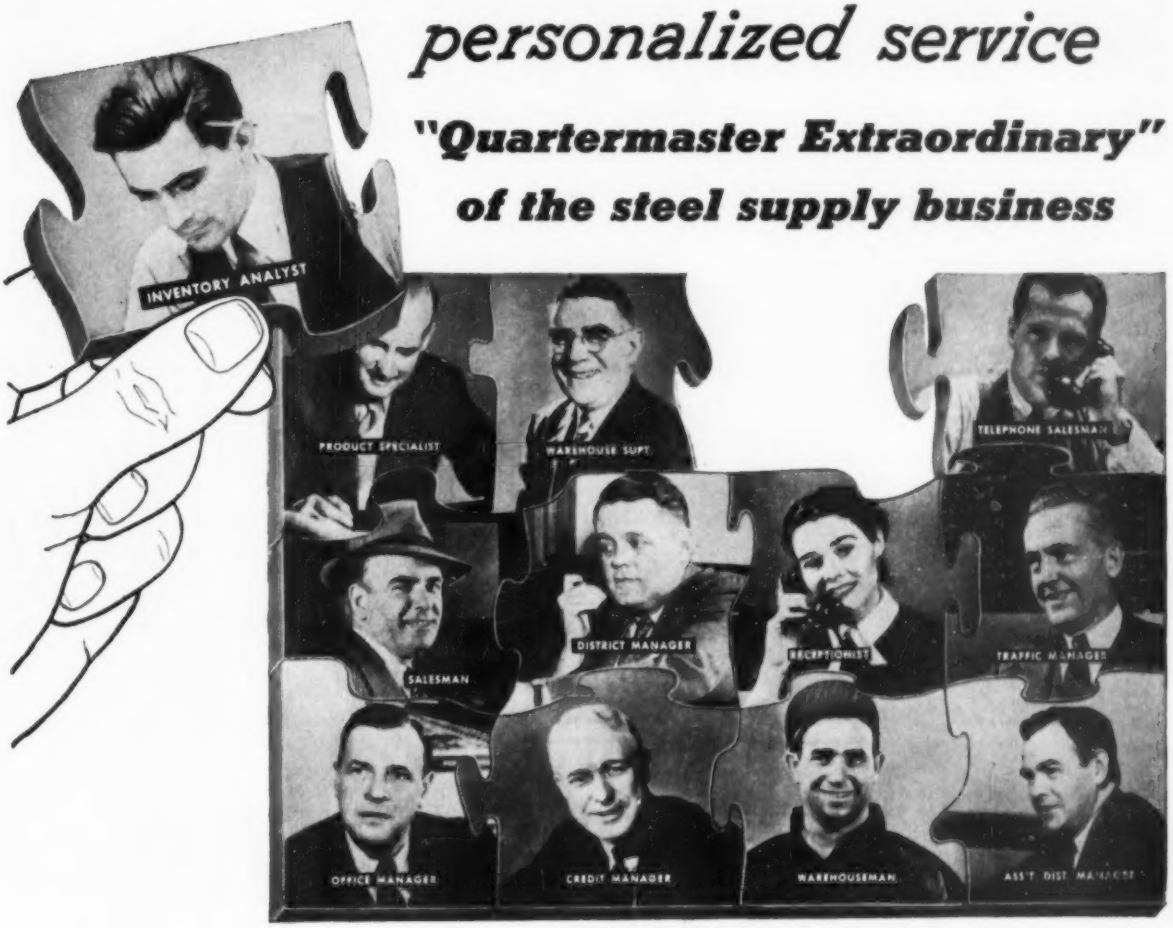
Time saved is money earned. Write now for information.

THE BULLARD COMPANY BRIDGEPORT 2, CONNECTICUT

The U. S. Steel Supply team that gives you

personalized service

"Quartermaster Extraordinary" of the steel supply business



THE principal job of each Inventory Analyst is to keep his warehouse well stocked so that your orders can always be filled in the shortest possible time. His specialized knowledge of steel sources, mill schedules and the stocks of all our 14 warehouses is of particular value to you when you want to locate special types of steel, an item not ordinarily stocked, or steel that may be in short supply. He is, in effect, your purchasing agent for steel. Efficient buying, based on his knowledge of your requirements, helps us maintain a schedule of reasonable prices.

Whether your steel requirements are run-of-the-mill or out-of-the-ordinary, talk to your U. S. Steel Supply salesman. He is your personal contact with one of the most efficient business teams at your command. Through him, the personalized services of U. S. Steel Supply specialists are concentrated on your needs. Their services are given promptly, courteously and completely.

YOUR "ONE CALL" SOURCE OF STEEL SERVICE

U.S. STEEL SUPPLY

UNITED STATES STEEL SUPPLY DIVISION, UNITED STATES STEEL CORPORATION
HEADQUARTERS: 208 So. LA SALLE ST., CHICAGO 4, ILL. WAREHOUSES AND SALES OFFICES:

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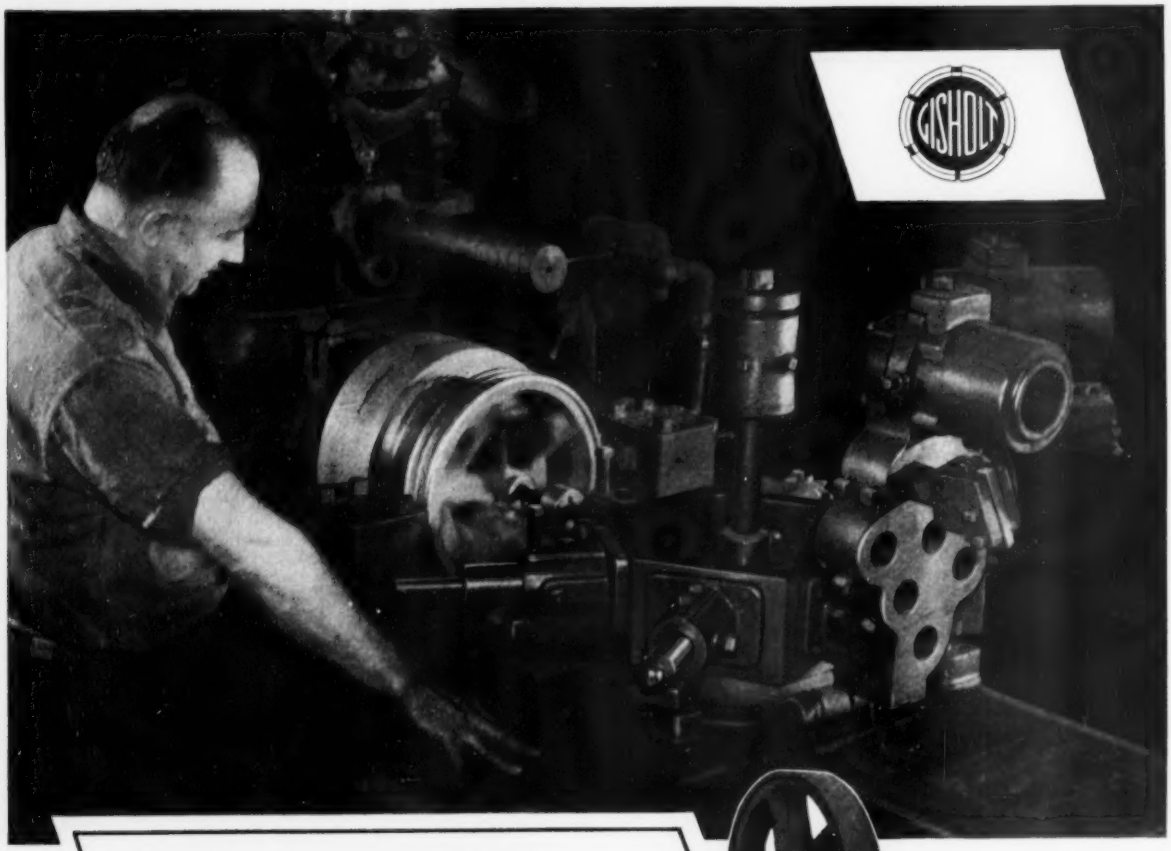
UNITED STATES STEEL



Production Trebled by the FASTERMATIC!

Rough Casting

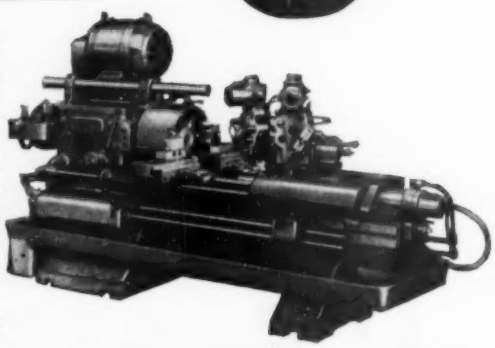
Finished Sheave

Note here the rather simple tooling arrangement for machining cast iron sheaves. This setup, similar to regular turret lathe work, is made just as easily. But here, the machine performs 15 different operations—holds tolerances consistently—completes the entire machining job in 13 minutes. The former time was 39 minutes.

Completely Automatic Cycle

It's the swift, automatic cycle of the Fastermatic that accounts for such substantial time savings. With its hydraulic feed system and automatic speed control, the operator has only to load the chuck, start the machine and remove the finished work. Usually, the operator has time to tend a second machine.

Now, when you need still greater production, it is a good time to look into the Fastermatics. Write for the Fastermatic catalog.



THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

The Fastermatics are universal automatic turret lathes. Designed for accurate, high production turning, they can also be economically used on comparatively small lot work.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

Pointing The Way To Lower Costs

Plant after plant, in every compass direction, has found that Cimcool® is a short and easy route to lower costs. And this revolutionary cutting fluid—this *chemical emulsion*—does a *better job*, while saving money three important ways:

CIMCOOL INCREASES TOOL LIFE (and thus reduces down time) because of its chemical lubricity.

FASTER SPEEDS are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

CIMCOOL COSTS LESS than old-fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. And because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

For a demonstration, write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

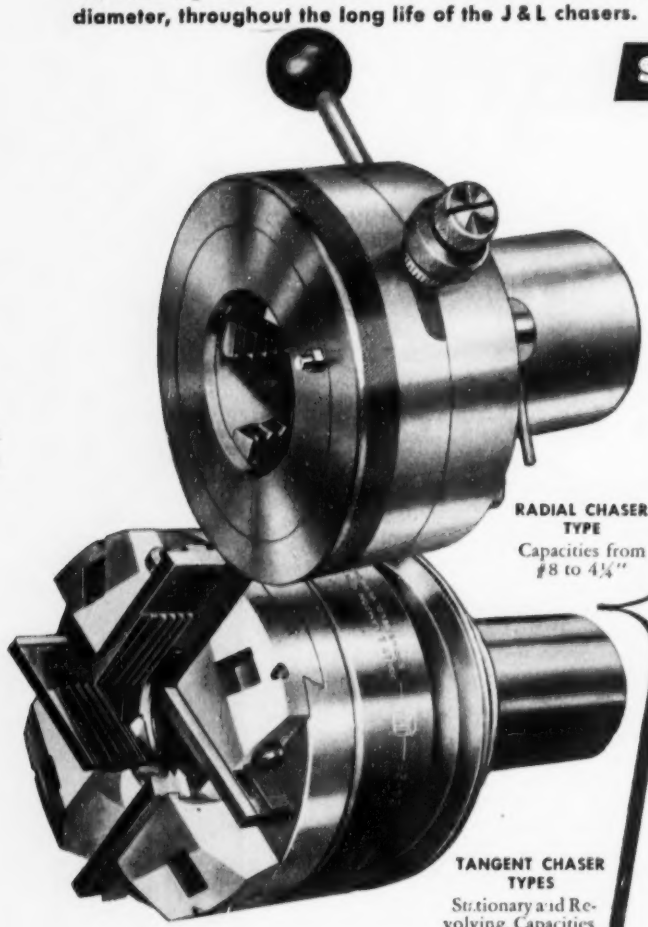
®Trade Mark Reg. U.S. Pat. Off.

A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.

for 85%
OF ALL METAL CUTTING JOBS

JONES & LAMSON GUARANTEES CLASS III THREADS with REPETITIVE ACCURACY!

J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.



RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving. Capacities from #4 to 2"

Some of the reasons why:

COMPACT, RUGGED DESIGN GIVES MAXIMUM SUPPORT TO THE CHASERS. J & L Dies are made of solid steel, no built-up sections, hardened and precision ground throughout. Chasers are supported at the point of, and in the direction of, maximum strain.

THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING. This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

EASY, CONTROLLED RESHARPENING. J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.

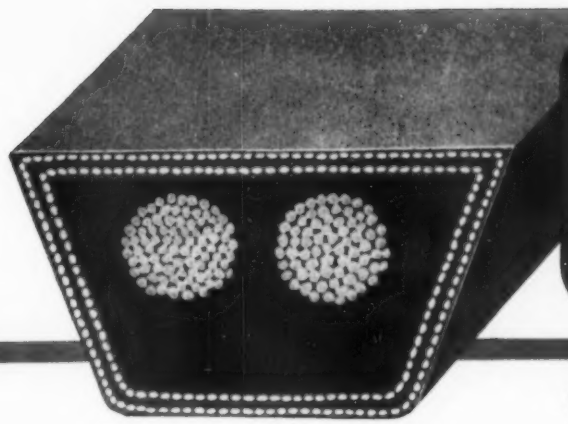
Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

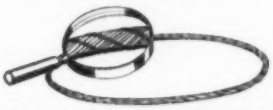
JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L DIE HEAD DIVISION



TEXROPE GROMMET V-BELTS

What is a Grommet?

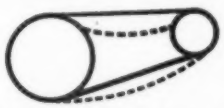


It's the endless rope of strong cords that pulls the load. It's twisted for strength . . . positioned in the belt so every cord pulls its full share of the load . . . and flexible to reduce internal friction. It's unlike anything else on the market.

Grommets Grip Better

Straight sides bulge slightly when belt passes around pulley. This helps give belt its tremendous grip. In addition, grommet belts are more flexible. No need for stiffening plies of cord. This, too, adds gripping power. Size for size, grommet belts give ½ more gripping power than ordinary belts, pull heavier loads with a higher safety factor. And less slip means less surface wear.

Grommets Stretch Less



Since there is no dishing, there is more strength in proportion to cord volume — and less stretch. Grommet belts stretch an average of two thirds less than ordinary belts . . . yet withstand shock.

No Dishing with Grommets

Each grommet carries its fair share of the load. In ordinary belts the center cords "dish" under high tension. Dished cords do less work. Grommet belts have no cords in the center of the belt.

3 WAY SAVINGS!

Here's how you save with TEXROPE grommet V-belts:

1. **Grommet belts cut costs — belts are constructed for long life.**
2. **Grommet belts reduce downtime — machines run with few stops.**
3. **Grommet belts cut maintenance — few man hours are spent making unnecessary belt changes.**

Grommets Cost No More. *Texrope* grommet belts cost the same as ordinary belts of the same rating. The savings you make are clear profit.

Grommet belts are made in C, D and E sections. They were developed as a result of cooperative research of Allis-Chalmers and B. F. Goodrich and are made under B. F. Goodrich patent.

Call your nearby Allis-Chalmers distributor or District Office for a set of long life grommet V-belts, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3940

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Sold . . .

Applied . . .

Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

PRESENTING

a new approach in single spindle machines

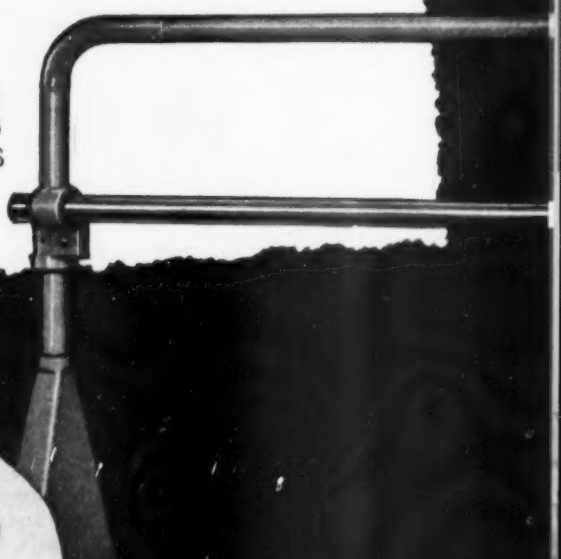
Here is a machine of remarkable mechanical simplicity and simplicity of operation. In addition to the many features guaranteeing quick set-up, Model 126 has the power, performance, accuracy, and rigidity for long as well as short runs. Let our sales engineer prove to you the advantages of these features:

1. No cams to change for main turret feeds.
2. No pick-off gears to change in selecting speeds and feeds.
3. Quickly adjustable standard wedge cams for cross slide feeds.
4. Automatic cycle completely controlled from central drum.
5. Pre-selected, automatically changed feeds for each of five turret stations.
6. Open tool area provides maximum chip clearance.
7. Coolant system and chip pan outside machine base.
8. Specifically designed for use of water coolant.

CAPACITY 2⅝" x 6"

Machines for making progress . . .

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES • LUCAS HORIZONTAL BORING, DRILLING & MILLING MACHINES • NEW BRITAIN +GF+ COPYING LATHES



Write

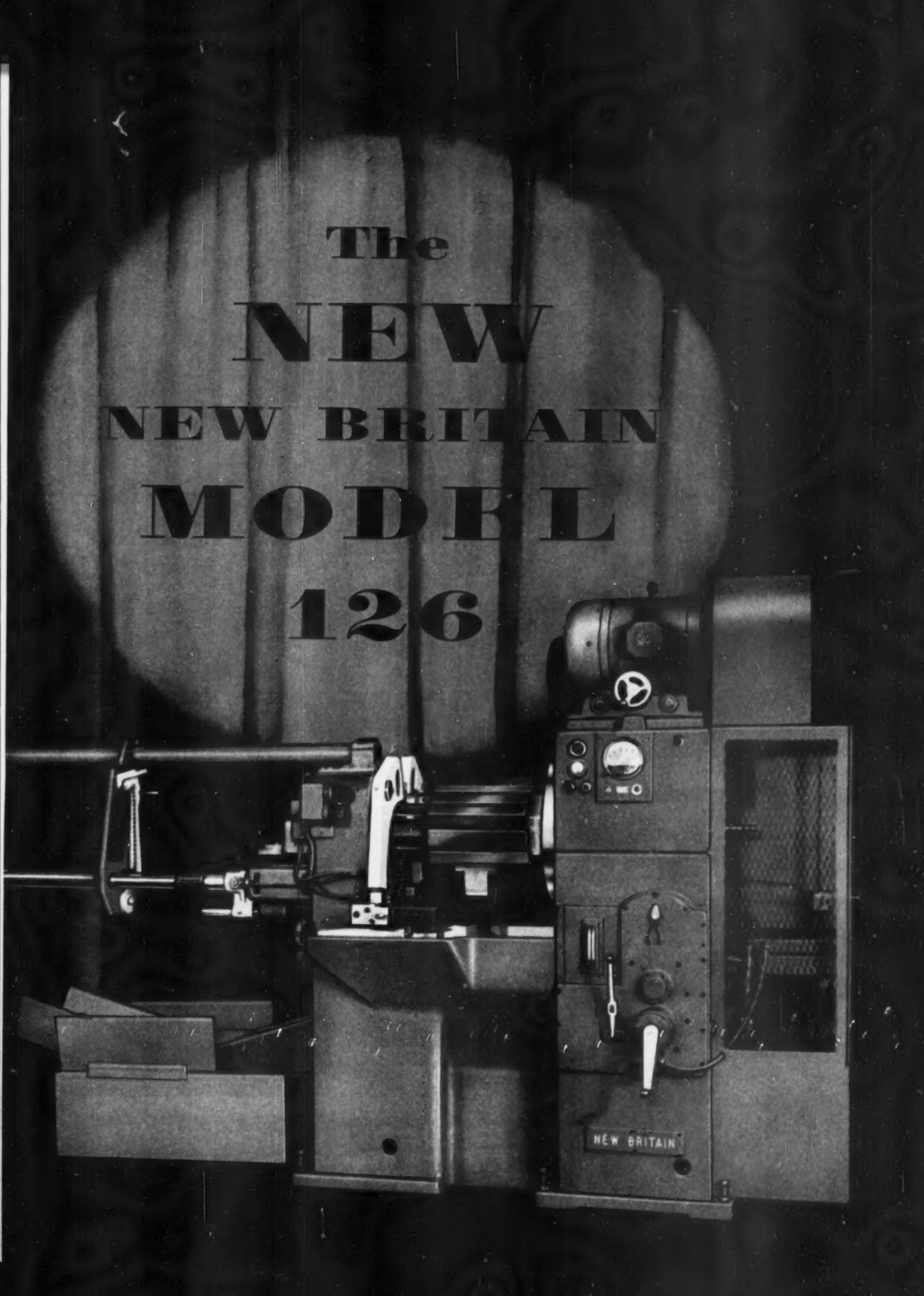
FOR DESCRIPTIVE LITERATURE

NEW BRITAIN

Automatics

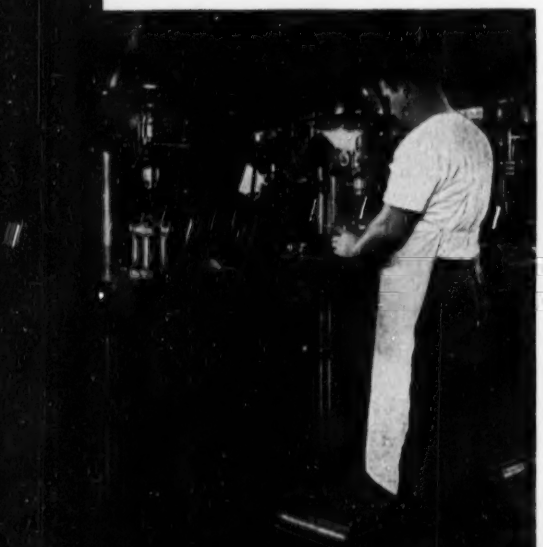
THE NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

The NEW NEW BRITAIN MODEL 126



DELTA Means VERSATILITY–

In one line at the Astatic Corp., 18 Delta drill presses work interchangeably on such materials as steel, zinc, plastic thermo and bakelite, aluminum and brass. Overhead lines carry power and air and are set up so that additional machines may be moved in and out of the line as job conditions change.



DELTA Means MOBILITY–

Says Astatic "An example of how we move our Delta tools to the job is the case of putting two 17 inch drill presses side by side so that a piece can be countersunk on one, tapped on the other by the same operator. In many cases we move Delta tools to the material instead of the material to the machine."

DELTA Means ACCURACY–

"With simple fixtures and Delta accuracy we make jobs practically fool-proof on machines which almost run themselves," reports the Astatic Corp. Astatic products for the communication industry are manufactured to high precision standards.

Down Go Costs WHEN ASTATIC CORP. PUTS DELTA TOOLS ON JOB

These Production Ideas Will Work For You, Too.

Here's how the Astatic Corp., Conneaut, O., gets high production and high precision at low cost with a shop full of Delta tools—drill presses, grinders, bandsaws, table saws, jointers and belt sanders. This story of a manufacturer of microphones, radio, phonograph and television parts can apply equally well to your plant.

FLEXIBILITY — Because Delta tools are light and mobile, Astatic takes them to the material to be machined, cutting handling costs. They are moved in and out of the production line as jobs change, already set up to eliminate down time. As many as five different materials from steel to plastics are machined on the same Delta tools.

INTERCHANGEABILITY — By standardizing on Delta, Astatic uses the same jigs and fixtures on several machines without adjusters.

FEWER SET-UPS — By keeping machines set up for special jobs one operator can tend several machines and do sequence operations on a single part before laying it down. No waste motion. Because Delta tools are a low capital investment, they don't have to run constantly to pay out.

QUALITY — Most of the Delta tools at Astatic have been on the job six to nine years with only routine maintenance. The Astatic record proves that Delta gives you machine tool quality at a cost any production operation in your plant will justify.

Do you have an up-to-date catalog of Delta tools? Call your Delta dealer. He's listed under "Tools" in your Classified Phone Book. Or write direct to Delta Power Tool Division, Rockwell Manufacturing Company, 618B N. Lexington Avenue, Pittsburgh 8, Pa. Ask for Catalog AB52.

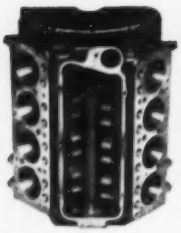
DELTA Means LOW COST—

Here's the Astatic story: "Because the cost of Delta tools is low, it is advantageous to maintain set-ups even if they are used only intermittently. Often an operator performs an operation on one machine, then turns to another for the second operation, saving the cost of repeated set-ups."

DELTA QUALITY POWER TOOLS

Another Product by **Rockwell**

Performs 180 operations in 43.5 seconds. Drills, spot-drills, rough-bores, c'bores, c'sinks, and reams. Includes 360° rotating fixture for removal of chips at station No. 11, and automatic gauge of drilled holes at station No. 17.



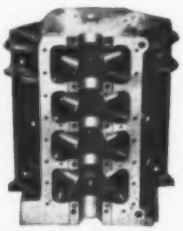
Capacity...

80!

CYLINDER BLOCKS AN HOUR

379!

OPERATIONS



GREENLEE

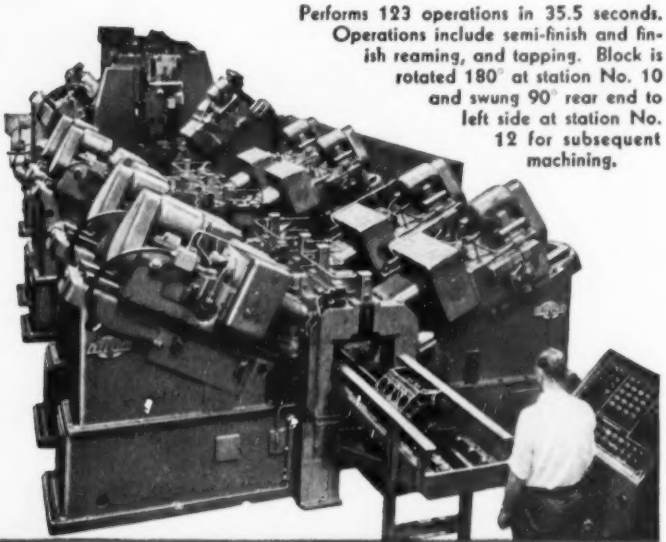
TRANSFER MACHINES

When you see one of these big Greenlee transfer machines working — turning out a tremendous quantity of work so smoothly and easily — you realize the qualities that make them great. Here is power, precision, durability, and a vast multiplicity of operations in a compact, integrated unit. Here is modern mass-production in its most successful form.

Greenlee's pioneering experience, added to years of accumulated skill, has created an organization that can successfully and repeatedly produce these outstanding machines.

Performs 76 operations in 43.8 seconds. Drills, c'sinks, c'bores, and trepans. Tilts part at station No. 1 to 180° for subsequent machining. Automatically gauges and cleans drilled holes at station No. 20.

Performs 123 operations in 35.5 seconds. Operations include semi-finish and finish reaming, and tapping. Block is rotated 180° at station No. 10 and swung 90° rear end to left side at station No. 12 for subsequent machining.



PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO. 1722 MASON AVE., ROCKFORD, ILL.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

How a carbide die outperforms a steel die by 25 to 1 for Schick, Inc.

In past six years, a Carboloy die (shown at left) produced over 62,500,000 parts with only 25 regrinds. It saved 4,375 hours of steel-die regrinding time . . . saved 900 hours of press setup time because of longer production runs. Carbide die produces over 2,500,000 pieces per grind . . . steel die, less than 100,000.

Carboloy Cemented Carbide die built for Schick, Inc., in 1946 by Lincoln Park Industries under direction of Mr. George F. Eglinton. Die is still in daily use.

You get more carbide benefits with Carboloy dies and services!

For blanking, forming, drawing and piercing dies that will stand up under terrific hour-after-hour pounding . . . always specify Carboloy Cemented Carbide.

It's quality-controlled by 29 rigid, probing tests that stem from Carboloy experience as world's largest maker of cemented carbides.

You get extra die life from Carboloy Cemented Carbide — hardest metal made by man — because extra life is built into it!

Carbide benefits

You or your die maker may order Carboloy Cemented Carbide made to your specifications in rough-finished form. You get all carbide benefits . . . and final finishing and assembly into your dies are easily done in your own toolroom, or by your die maker.

Carbide specialists

Carboloy Field Engineers are ready with on-your-job solutions to tough die problems . . . and ready to help you design new carbide applications.

Carbide training

Your key toolroom personnel can learn latest carbide techniques, become expert in finishing and servicing carbide dies at the Carboloy Customer Training School.

Carbide data

For a handy, all-inclusive guide showing how easy it is to design, use and maintain carbide dies, write for the Carboloy Die Engineering Manual, D-124.

To get the complete story of how Carboloy dies and engineering services offer more carbide benefits . . . greater production with less downtime and maintenance . . . fewer rejects and less refinishing . . . call in your local Carboloy representative or use the handy coupon below.

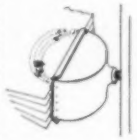
"Carboloy" is the registered trademark for the products of Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11149 East 8 Mile Ave., Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

Magnet ideas for the shop!

Use Carboloy Permanent Magnet Sheet-Steel Separators to prevent feeding of doubles. And use permanent magnets to give an extra hand all around your shop. They're great for magnetic stands, tool-holding devices, sweepers' pickup tools, magnetic paper grippers, containers for small parts and magnetic retrievers. Write for Carboloy Permanent Magnet Stock Catalog, PM-100. (Use coupon.)



CARBOLOY Department of General Electric Company
11149 E. 8 Mile Ave., Detroit 32, Michigan

We are interested in the Carboloy services checked below:

☐ Die Training School ☐ Die Engineering Manual, D-124 ☐ Permanent Magnet Stock Catalog, PM-100 ☐ Have a Carboloy Field Engineer call.

Name _____ Position _____

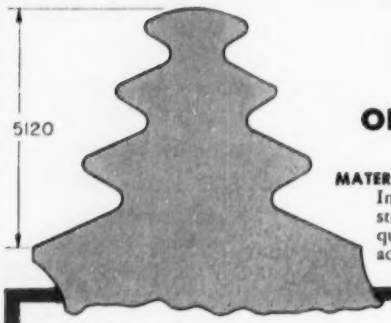
Company _____

Address _____

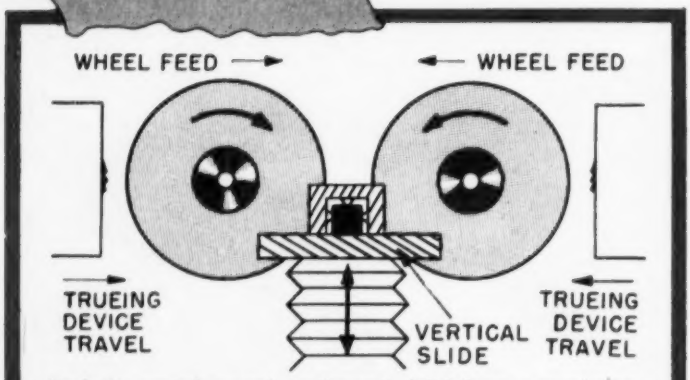
City _____ Zone _____ State _____

FORM GRINDING JET ENGINE BUCKET ROOTS FROM THE SOLID!

ON J & L DUAL-WHEEL AUTOMATIC FORM GRINDERS



MATERIAL BORDERS ON UNMACHINABLE Intense heat and great centrifugal stresses on the pressure surfaces require the toughest material and most accurate finish.



Bucket is mounted on a reciprocating vertical slide for two-way grinding.

AUTOMATICITY SPEEDS PRODUCTION — MAINTAINS REPETITIVE ACCURACY — Operation is simplified to the push button stage by a completely automatic work cycle.

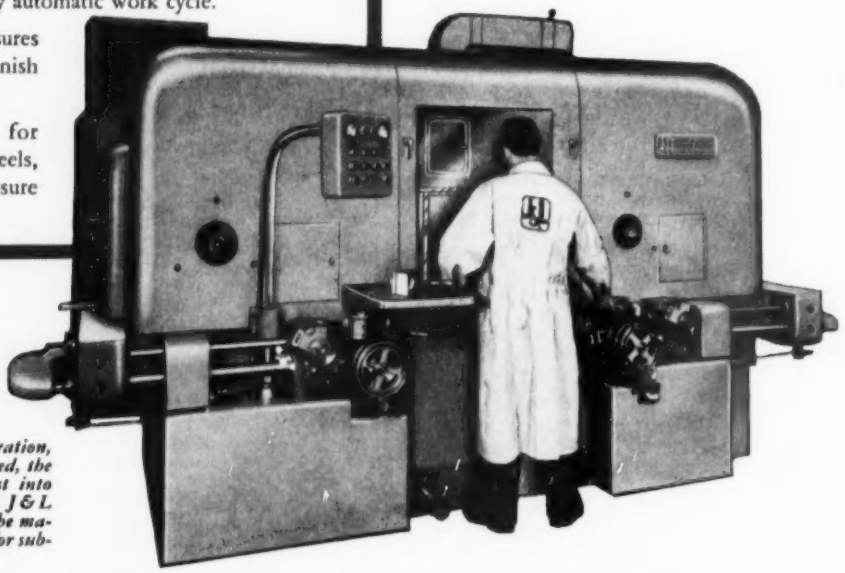
Automatic wheel trueing assures accuracy of form — includes finish trueing before final cut.

Automatic compensation for amount dressed off the wheels, and automatic wheel feed assure accurate sizing.

FEW MORE DIFFICULT GRINDING JOBS EXIST — Yet both sides of the root are ground simultaneously, to gage tolerances, on a production basis.

REPETITIVE ACCURACY MAINTAINED
Spacing of pressure surfaces within .0002
Taper within .0005
Angles within 10 minutes
Thickness from .0005 to .001

ACHIEVEMENT RESULT OF SEVERAL YEARS' RESEARCH AND EXPERIMENTATION — This application of the proven principles, long incorporated in J & L Thread Grinders, was initiated several years ago. The first machine was delivered in 1948. Continued study and subsequent refinements have helped lick one of the toughest machining problems of our day. Perhaps we can help you too.



Before the grinding operation, the foil contour is checked, the blade oriented and cast into a matrix, on a special J & L Optical Comparator. The matrix serves as a fixture for subsequent operations.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

THREAD GRINDER DIVISION

ENGINEERS SPECIALIZE IN TAPS AT HY-PRO!

. . . Let Them Help You Save Time and Money

Taps make up the bulk of our output. That's why our design and production engineers are able to concentrate their work on the perfection of this one important line. From this specialization has come the Hy-Pro reputation of top quality and know-how for all tap needs.

These engineer specialists are ready to assist you at any time, whether it is a particular problem or advice on your regular operations.

Phone or write today for information. Hy-Pro's complete line of taps and experienced engineer specialists are always at your call.

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PARKER-KALON®

The Original

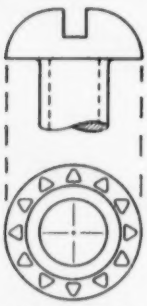
SELF-TAPPING SCREWS

NOW...

Signed

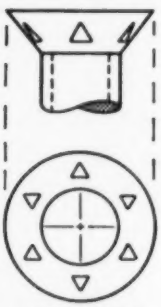
For Your Protection

NON-COUNTERSUNK HEADS



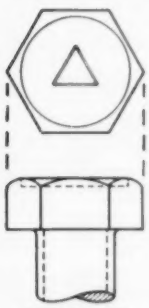
12 IMPRESSED TRIANGLES UNDER HEAD

COUNTERSUNK HEADS



6 IMPRESSED TRIANGLES UNDER HEAD

HEXAGON HEADS



1 EMBOSSED TRIANGLE ON TOP OF HEAD

Signed Like the hall mark on fine silverware, this triangle mark now impressed on all P-K Self-tapping Screws signifies the maker's pride of craftsmanship. This "signature" will serve for your protection against substitution.

Certified Now, the P-K triangle mark will certify every screw that bears it as a genuine Parker-Kalon product, made by the *originators* of Self-tapping Screws. Now, you can be sure, when you see this mark, that you are using the *only* Self-tapping Screws made with the accumulated "know-how" of 40 years of enterprising leadership.

Guaranteed Now, identification goes beyond boxes or other containers and labels. The screw identifies itself, and when you see the P-K triangle mark you know it is the *guaranteed* screw, backed by the "Guarantee of Highest Quality" printed on every box. Look for the P-K triangle on the screws you buy and use. It's your one sure way to guard against job-slowing, parts-wasting screw failure . . . the way to make *planned* assembly savings *pay off*. Parker-Kalon Corporation, 200 Varick St., New York 14.

IF IT'S P-K IT'S O.K.

TRADE MARK.
REG. U.S. PAT. OFF.

WHAT *Life-Line* REALLY DELIVERS IS MORE SERVICE...LESS SERVICING

The way to grease modern motors is DON'T!

The modern, *pre-lubricated* Life-Line consigned faulty lubrication to the motor museum almost ten years ago.

Think what it means. No more incorrectly greased motors. No failures from overlubrication, from under lubrication . . . from use of incorrect or dirty grease. Correct lubrication is sealed in . . . in advance.

Result? Longer motor life. Over a half million *pre-lubricated* Life-Line motors operating in every conceivable type of application have proved that outages from incorrect lubrication have been eliminated completely.

Take the case of an eastern manufacturer, for example. Motors were installed high on a press—out of reach of a maintenance man. Consequently, motor lubrication was forgotten. Bearings failed—windings burned. Then *pre-lubricated* Life-Lines were installed. Failures disappeared. Today, motors are still forgotten—but safely.

Remember, the way to lubricate a modern motor is don't. And, to spot a *truly* pre-lubricated motor, look for a motor that has *no* grease fittings. You'll *know* then it needs no greasing attention. You'll find your answer in Life-Lines.

Ask your nearby Westinghouse representative for a copy of "Facts on Pre-lubricated Bearings", B-4378, and for all the reasons why Life-Lines offer you more service on the job . . . less servicing. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21682-A

YOU CAN BE SURE...IF IT'S Westinghouse

Takes on all comers!

This 42-72-84 Blanchard Surface Grinder is used for machining many sizes of torch cut steel plates. As the first operation after cutting, Blanchard grinding removes the proper depth of stock as required, frequently up to ⅛" per side, producing surfaces accurately flat and parallel for laying out or further machining. Work up to 7 feet across corners is regularly ground on this machine. In spite of its size, this grinder is as easily controlled as the smaller Blanchard grinders.

Typical of work produced is the 48" x 48" x 10" machine steel, die mounting plate, at left. 58 cu. in. of stock (.025" per side) is ground off in one hour and 35 minutes, floor to floor, with flatness held to .001". Note the magnetic hoist —a good tip for loading and unloading the Blanchard quickly.

Regardless of your requirements for stock removal, tolerances or surface finish, Blanchard has the grinder and grinding wheel to do each job best.

Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE **BLANCHARD**

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

CUT COSTS With

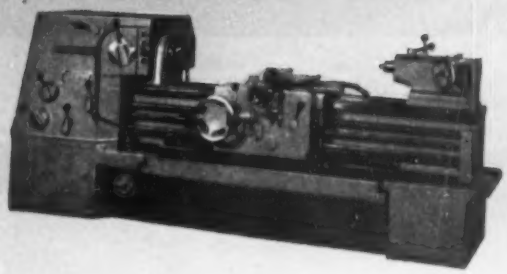
SPRINGFIELD

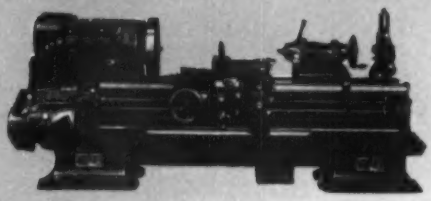
LATHES

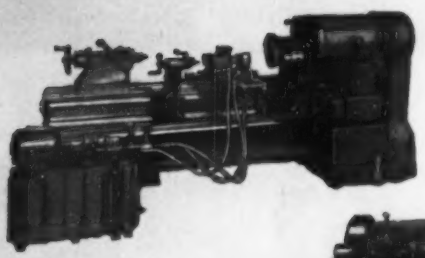
handle a wider range of work—

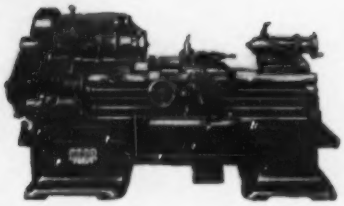
increase output—

lower operating costs









TURNING
CONTOURING
PROFILING
ENGRAVING
REPRODUCING
BORING
THREAD CHASING
RELIEVING

14" to 32" sizes for heavy manufacturing operations or sensitive tool room work

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

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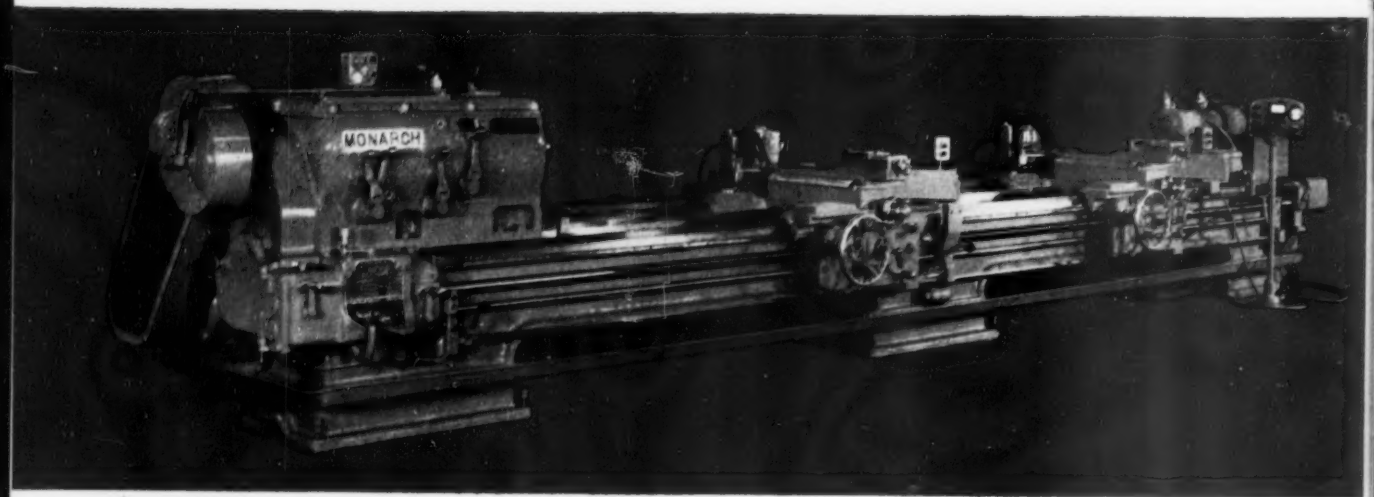
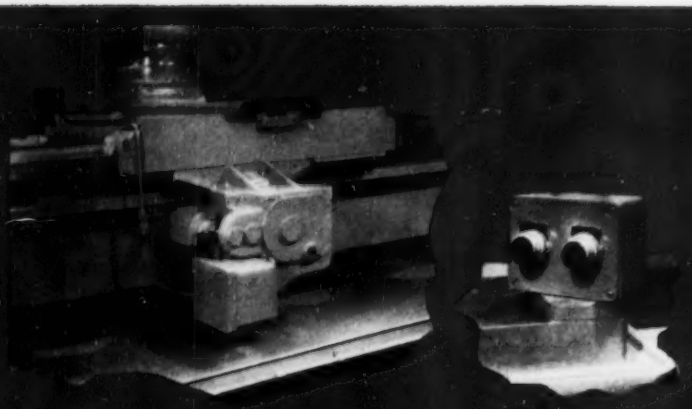
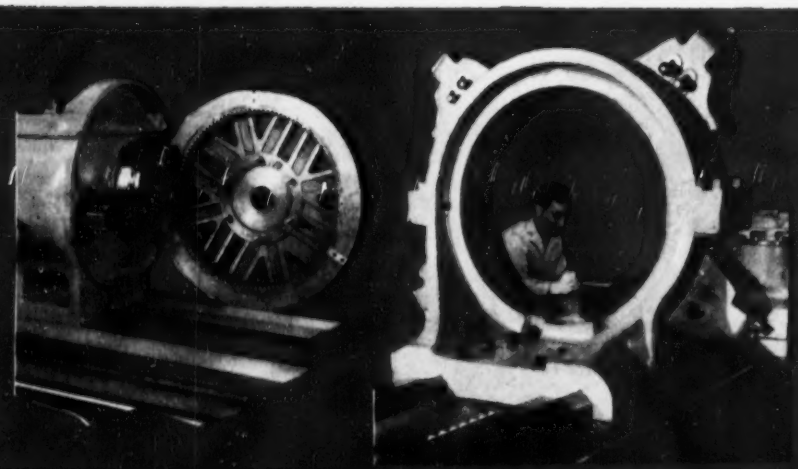
EXCLUSIVE REPRESENTATIVES IN ALL PRINCIPAL CITIES





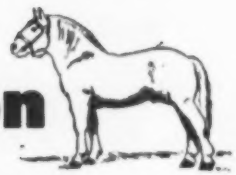
PLUS CONTROL. A smoothly functioning rapid traverse in either direction is furnished by unit mounted at rear of machine (left). Push button controls on front carriage wing (right) give instant response only when depressed. Standard on 25" Model N and 32" Model NN, optional on 20" Model M.



PLUS POWER. For heavy stock removal from large diameter work, the optional face plate drive headstock is a "must" (left). It insures full, even delivery of power under load. Drive may also be taken through spindle. Steady rests of great capacity and strength are provided. This one (right) will take work 36" to 38½" diameter.

Monarch 25" Model N with long bed. Note optional dual carriages—ideal for peak production on long shafts and gun barrels. Perfect performance is noted with two tools turning simultaneously. Air-Gage Tracer Controls can be supplied for both carriages (as shown), either carriage, or neither. Monarch-Keller controls can also be furnished.

BIG Monarchs



Powered like a Percheron

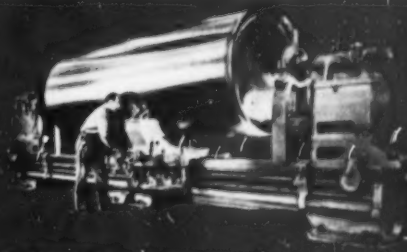
Nimble as a Pony

Imagine a great steel-muscled Percheron with the instant, spirited responsiveness of a polo pony—and you've got a picture of the Monarch Heavy Duty Lathes. Here are lathes with the size, power and rigidity to hog off heavy cuts from big work—yet built to provide high finish, close accuracy and convenience of operation! Witness the great number of them—both with and without Air-Gage Tracer controls—speeding production of critical jet aircraft parts today.

Here's unequaled strength and versatility within the capacities offered—20", 25" and 32" swings in standard lengths up to 324" between centers. Look at the special features and applications we've found room to illustrate here. Then write for our Booklet #1208—36 pages of data and pictures—for the complete Monarch Heavy Duty Lathe story. We'll send it gladly . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES



PLUS SWING. *For maintenance and repair work—for occasional big parts, light cuts on big diameters, and turning shafts with previously machined large sections, plus swing up to 60" and more can be provided. This Model SN, shown turning a paper machine drum, swings 84"*

SURROUNDED BY PLUS VALUES

THE LEES-BRADNER "40" THREAD MILLER

It takes precision plus to thread shell cases accurately for the reception of delicate fuse mechanisms. Speed, easy loading and semi-automatic operation are other important considerations.

That's why the Lees-Bradner Model "40" Thread Miller was chosen to perform this highly important operation.

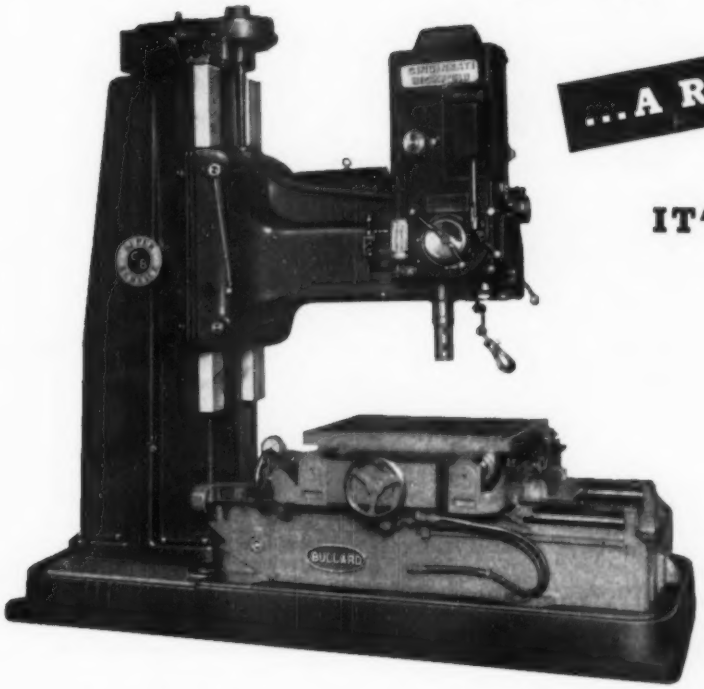
You, too, can get unusual accuracy at high speed and with a minimum of scrap on precision threading operations. Just contact your Lees-Bradner representative and ask him for all the details on this remarkable machine.

the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

Here's thrifty accuracy

...A REAL COMBINATION



IT'S BICKFORD

IT'S BULLARD

...for REPRODUCED ACCURACY without a single jig

Outstanding accuracy, increased production and cost lowering can be assured by using this natural combination of the precision Cincinnati Bickford Drilling Machine and precision Bullard Spacer.

Jig expense, as well as storage and maintenance costs, are eliminated.

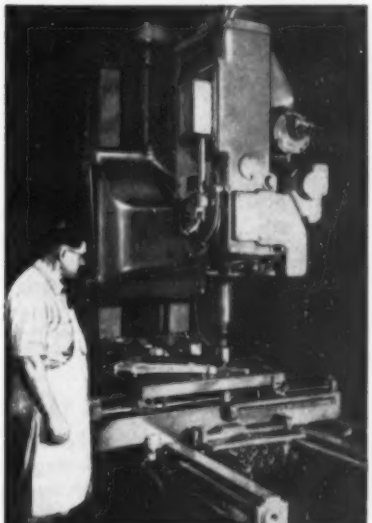
The new job can go into immediate production with interchangeable accuracy, with no lost time waiting for jigs and fixtures to be designed and built.

The wide range of speeds and feeds and the extra rigidity of the spindle and frame of this Cincinnati Bickford Precision Drilling Machine, and the convenience and ease of operator control, assure speed on the job and a wide range of use of the machine.

Actual production time is reduced as no jigs are handled by the operator.

For low cost, increased speed and great accuracy, look into this profit-making combination.

Write for Circular FH.



The Lockheed Aircraft Corporation, Burbank, California, finds the Cincinnati Bickford-Bullard combination ideal for fast, repetitive drilling on a variety of work.

PHOTO COURTESY
LOCKHEED AIRCRAFT CORPORATION

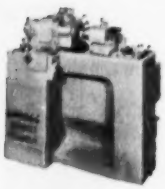
CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio U.S.A.

bryant
internal grinding

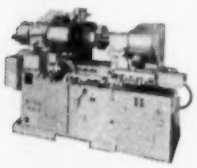


no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

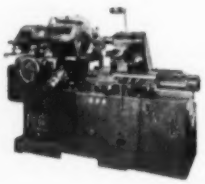
no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".



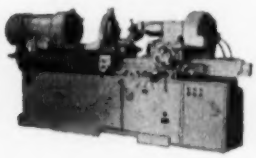
no. 1316

Two wheelheads for high production of jobs requiring face and bore, or face and O.D. grinding. Max. traverse stroke, 20". Max. grinding length, 8".



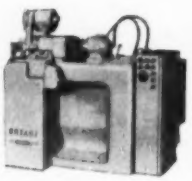
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



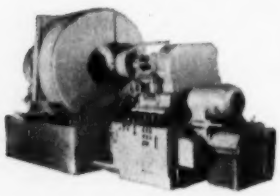
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



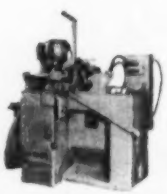
no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



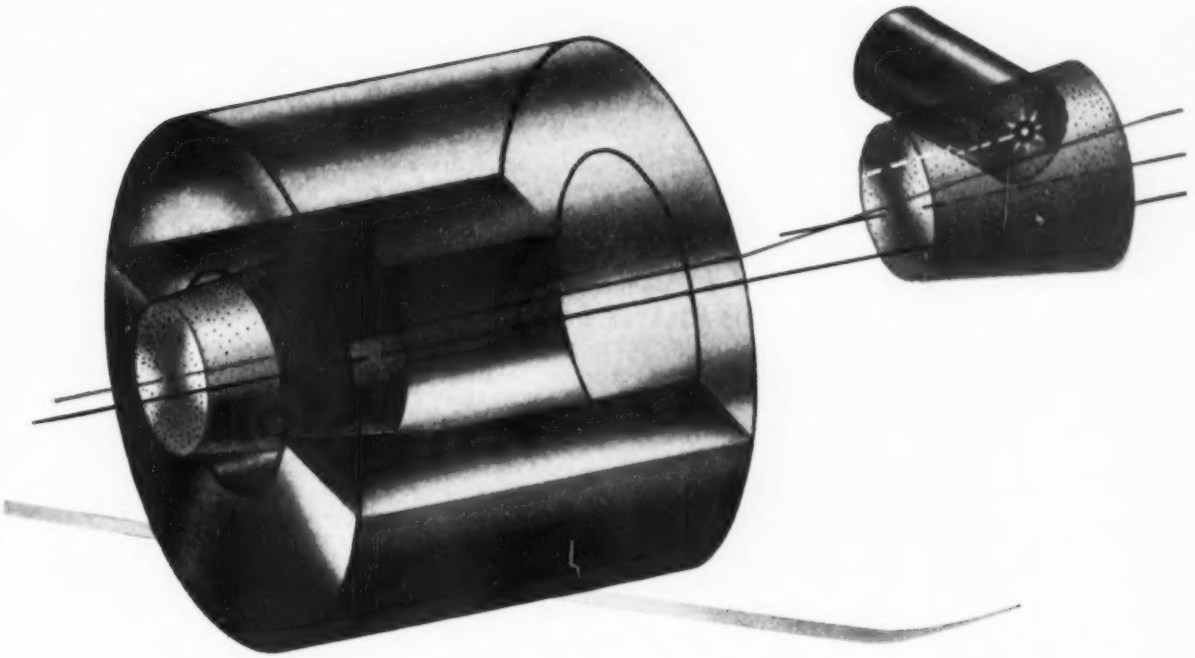
no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



IT is common assumption in internal grinding that once the grinding wheel passes the diamond, all errors will be eliminated and the wheel will be a perfect cylinder. It is also assumed that this grinding wheel can produce a straight hole. These two assumptions are true if the wheel path is a straight line parallel with the axis of the wheel as it passes the diamond and traverses the work.

In the illustration, the wheel slides are badly worn and the wheel path is not a straight line. The distortion in the ways causes the wheel to move gradually away from the diamond and the wheel is dressed to a taper as it passes the diamond. Then, as the tapered wheel traverses the work, it will grind only on its large diameter. At the point of reversal the tapered form will be transferred to the work. If the traverse stroke is lengthened, the tapered section will be moved to the new point of reversal. In addition, wheel wear will be excessive, finish will be poor, feed lines may be visible.

Available information advises simply turning the workhead or changing the length of traverse to correct taper. In the case illustrated, neither turning the workhead nor changing the length of traverse will produce a straight hole. The only possible remedy is to straighten the wheel slide ways which will, in turn, straighten the wheel path. The wheel will then contact the work properly, producing correct geometry of the hole, longer wheel life and better finish.

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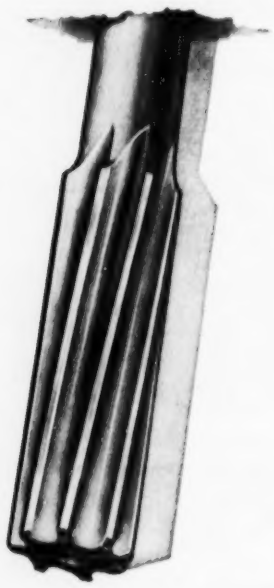


The Reamer Specialists

LAVALLEE & IDE, INC.

CHICOPEE, MASS.

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

This Hacksaw Business

In reference to the discussion on the proper position of power hacksaw blades (*AM*—Nov 24 '52, p102), may I point out that there are two types of machines in use today? One, which is old, is the push-type machine, and the other, a more modern machine and one to be found more often, the draw-cut type. When inserting a hacksaw blade on a power machine, the direction of the teeth should be checked, and the direction depends on the type of machine being used. When operating a draw-cut machine, the teeth of the blade should point away from the operator, while on a push-cut machine toward him.

If a blade is put into a machine incorrectly, that is, with the teeth facing in the wrong direction, it will make a few cuts. This is not sawing as is commonly known, but rather, through the heat-pressure of the machine, the blade is forced to burn its way through the material. Such cutting, if you wish to call it cutting, is accompanied by smoke, and the machine labors heavily. If a person does not care in which direction the teeth are facing, just let him keep a record of the number of cuts per blade and the time per cut, and he will find that his cost per cut has gone up tremendously with the reversed blade. Even in cutting, there is a right way and a wrong way.

E J Blease
Hacksaw and Band Saw Div
The L S Starrett Co
Athol, Mass

Where's Moly?

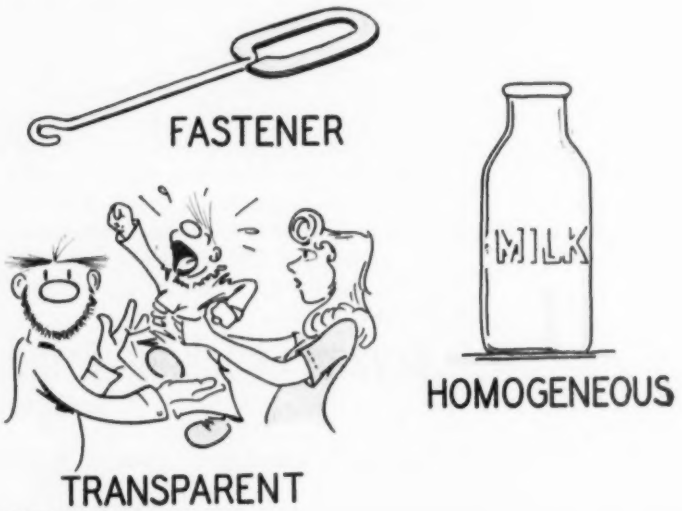
In a recent article (*AM*—Dec 22 '52, p106) you mentioned the use of molybdenum disulphide as a lubricant that seems like the answer to a machinist's prayer. But some of the claims you make for it seem like a publicity man's dream. Will it really do all those things, or are they just what someone hopes it will do? Is the material available, or is it still in the laboratory stage? If available, where can it be bought?

Wm Bradbury
Chicago

The results given in the article were obtained by an impartial user in actual shop practice. The material is on the open market and can be ob-

GRINETICS

By D. G. SMITH



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DIESEL ENGINES

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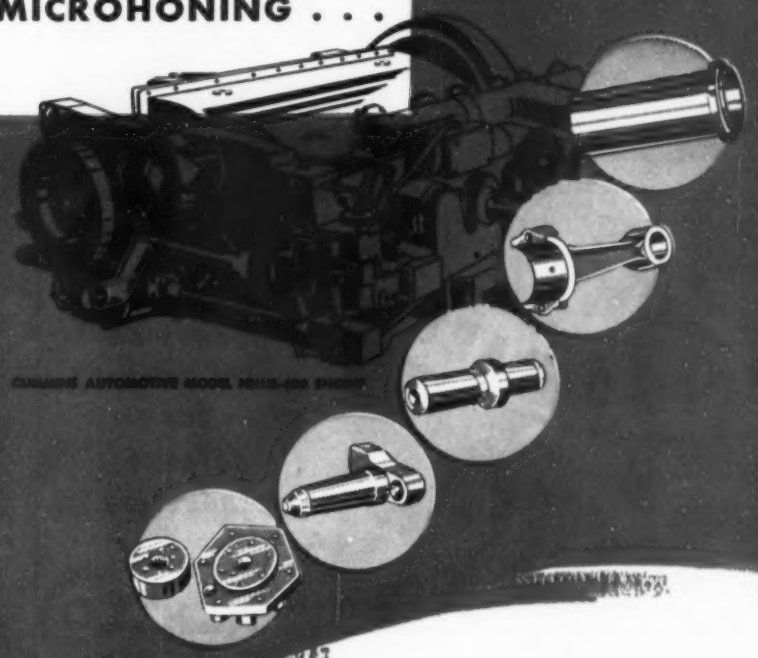

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Above left—Tooled for marking part numbers on the I.D. of steel rings—component parts for aircraft engines.

Above right—Tooled for marking aircraft engine rocker box covers.

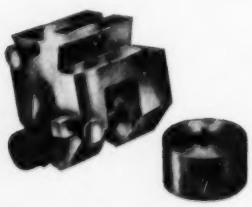
ROLL-O-MARK'S Versatility

Speeds up metal marking for defense production

All-pneumatic Model 50P1

Whether it's an aluminum forging that requires a marking machine sensitive enough to provide a shallow mark without distortion—or the critical marking of the steel ring described above—Roll-O-Mark is ideal for the job.

Roll-O-Mark offers such outstanding features as—pneumatic table pressure for positive uniformity of impression—pneumatic operation of die slide—the Noblewest *roll-marking* process for producing sharp, permanent impressions that will last as long as the product itself . . . marking better, faster (up to 1200 pieces per hour), and at lower cost. It will pay you, as it has hundreds of other manufacturers, to put your marking problems up to Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Conn.



A mark is only as good as the die that made it. Noblewest marking dies are made by master craftsmen to exacting standards that result in clearer impressions and longer life . . . the ideal dies and die holders for production marking equipment.

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

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tained in the necessary degree of purity. The Molykote referred to in the article is produced by Alpha Corp, Greenwich, Conn.—Ed.

Try Vacuum

The letter to Arthur Rogers (*AM*—Dec 22 '52, p74) lists his troubles in machining small nylon parts. The nylon chip is very tough and it is difficult to break it with a chip-breaker tool.

We would like to suggest that he try removing the chip as it forms with a vacuum nozzle placed close to the tool. This could be simply rigged up by using an industrial vacuum cleaner.

L H Cirker

Polychemical Dep't, Research Div
E I du Pont de Nemours & Co

Music Hath Charms

You had a great deal to say in your Special Report on Noise (*AM*—Dec 22 '52, p109), but you made no mention of the worst noise of all—the kind that is deliberately produced. I mean, of course, the so-called music that is blatted out of loudspeakers in so many plants with the mistaken idea that it makes people happy.

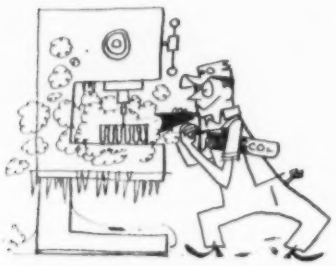
Yes, I know I'm an old crab but, as a matter of fact, I like music, good music. And Christmas carols sound fine on the plant system for half an hour or so. But when a guy is trying to work to close tolerances it doesn't help to have a bunch of morons with trumpets, each apparently playing a different tune and each trying to drown out the others. And then, just when you are trying for that last ten-thousandth, some fool slams a drum and cymbal.

I know cows give more milk when milked to the sound of music, but a machine shop isn't a farm. And who wants to be a cow? I'll agree it may help to ease the monotony on simple, repetitive jobs that need nimble fingers and no brains, but I maintain that it has no place where a man needs to concentrate and keep his

mind and hands alert on precision work. By all means, get rid of plant noises, but don't forget the violently annoying man-made ones.

C R Prince
Charleston, W Va

We are inclined to agree with Mr. Prince. Considerable discretion should be used in the selection of in-plant music, both as to its type and the areas in which it is played. The subject has been studied extensively, and the general opinion seems to be that it is a help when played for fairly short periods at the usual let-down times, say at 11 am and 3:30 pm, but not desirable where it becomes a source of annoyance.—Ed.



Refrigerated Nylon

I note that Mr Arthur Rogers, of Buffalo, has written you (*AM* —Dec 22 '52, p74) asking for advice on how to machine nylon. We should like to confirm your answer of using a jet of CO_2 gas as being a help.

The headquarters manufacturing div of Westinghouse has been using this technique for the past year with excellent results.

D C Goldberg
Westinghouse Electric Corp
Philadelphia

Tips

I found some time ago in the Shop Equipment News a certain product described which I can't find any more, and I wonder if you could help me and give me the manufacturer's name and address.

It is a conical cap for refacing new and used lathe centers with either high speed steel or carbide.

H Landauer
Tampa, Fla

It took a bit of finding, but your memory was not at fault. We published the item in 1949. It concerns a conical tip that can be silver soldered to the end of lathe or grinder centers, made by Diamonds & Tools, Inc, Div of Wall Colmonoy Corp, 19345 John R St, Detroit 3, Mich.—Ed.

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Simple... to Set Up

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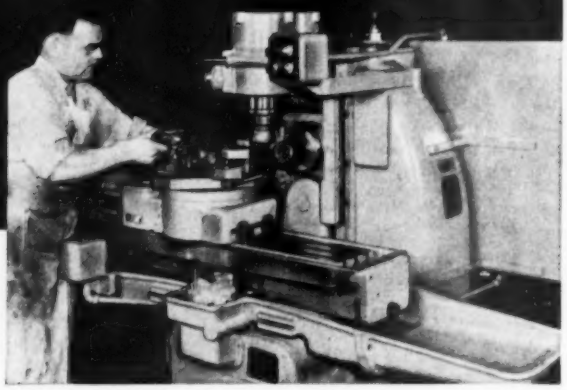
Here's what can be done with Standard Rigidmils...

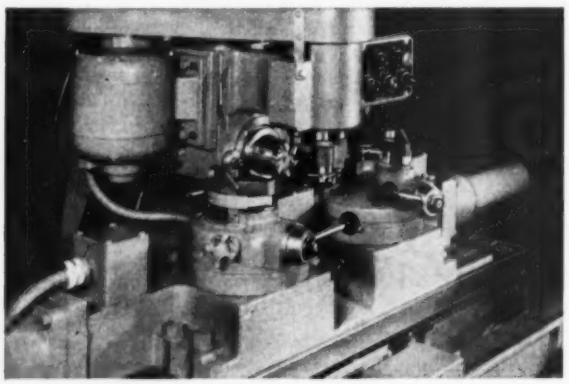
TO SOLVE SPECIAL MILLING PROBLEMS

On standard Sundstrand Rigidmils, the head is a self-contained unit which can easily be replaced with a special head. Consequently, when production or work requirements permit machining several surfaces simultaneously, the standard head can be replaced with a special head, and a *special* job done with the lowest possible capital investment. Furthermore, putting into effect product changes (a difficult problem for many production engineers) doesn't worry anybody in plants where Rigidmils are installed. As these machines can be converted so readily to meet production changes, they represent a combination of maximum production with minimum capital investment. Here are six good examples of standard Rigidmils "engineered" to a production job with "only the head as special".



Special 2-Spindle Head Mills Top and Side of Part Simultaneously

This standard Sundstrand Rigidmil has a special head with one vertical and one horizontal spindle for milling two surfaces of refrigerator cylinders in one automatic cycle. Additional production is obtained by the two indexing fixtures, which permit loading of one part during the milling of another. Production is 150 parts per hour.

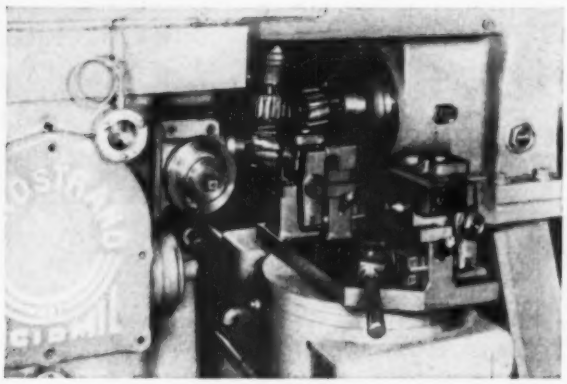


Face Milling and Slotting With Special 2-Spindle Head

This Sundstrand Rigidmil is provided with a special high speed head equipped with one vertical and one horizontal spindle. Each spindle has endwise adjustment, and horizontal spindle is provided with automatic retraction. Two power-operated rotary tables are timed and interlocked with the automatic table cycle for rotary milling of the face and slot in washing machine brake shoes. Manually clamped fixtures hold the part for a cycle of load and unload at one end while milling at opposite end. Production is approximately 145 per hour.

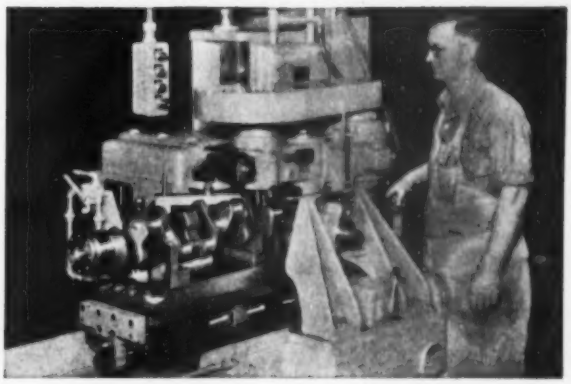
SUNDSTRAND

RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



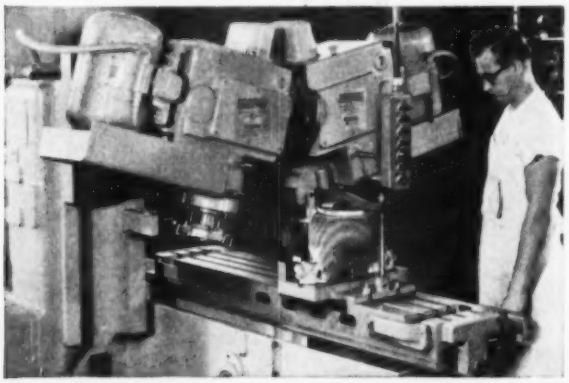
Three Sides of Part Milled Simultaneously With Special 3-Spindle Head

The standard Rigidmil above has a special head with one vertical spindle and two opposed horizontal spindles offset vertically. The top and both sides are milled in one automatic cycle. Not only are operations saved, but the three surfaces are held in accurate relation to each other. Again, automatic indexing of fixtures provides free loading time and helps obtain the production of 172 pieces per hour.



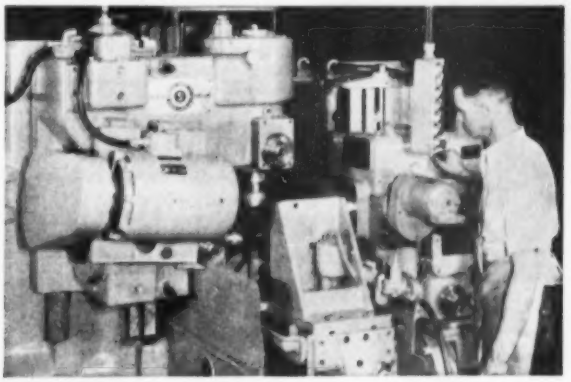
Straight and Woodruff Keyways Milled With Special 2-Spindle Head

Here's a standard Sundstrand Rigidmil "tooled" for a special keyway milling job. It is provided with a regular horizontal spindle head for milling a straight keyway and an attached pivoting head for milling a Woodruff keyway. Both keyways are located in one end of the crankshaft and both are milled simultaneously. Keyways are held in definite relation to each other by milling both in same setting of crankshaft.



Duplex Rigidmil Has Two Special Heads for Angular Milling Operations

This Sundstrand Duplex Rigidmil is equipped with two special heads for angular milling on aircraft cylinder heads. With workpiece inverted in fixture, the milling heads, one set at 10° and the other set at 15°, mill both rocker bosses simultaneously. The machine operating in automatic table cycle of rapid approach, feed and rapid return completes 64 cylinder heads per hour.



Duplex With One Special 2-Spindle Head Mills 3 Surfaces Simultaneously

A special two-spindle head is mounted on the left hand column of this standard Sundstrand Duplex Rigidmil. One is a vertical spindle and the other is set at 5° from horizontal. The right hand column carries a standard horizontal head. Pads on both sides and top of transmission cases are milled in automatic cycle at the rate of 67 pieces per hour.

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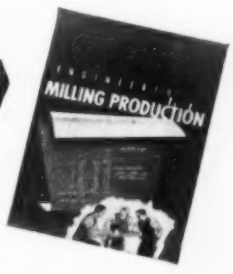

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SPOT NEWS of Metalworking

- **Movie-film-controlled automatic gear shaper** speeds up cutting of non-circular gears (a sort of toothed cam) for complex fire control equipment. Developed by Dr Fred W Cunningham, the Fellows No. 72 gear shaper will produce gears for T-41 rangefinders and other defense items. (See page 149).

- **Republic Steel is going into direct production of steel kitchens in April** through its Berger Mfg Div, Canton, Ohio. This will mark Republic's initial entry into the consumer product field, although Berger has been producing steel kitchen cabinets for several years. Berger's sales manager will boss entirely new sales set-up.

US has no lack of facilities for casting or forging parts for the Air Force heavy press program, according to informed trade sources, in spite of some business having been placed abroad.

- **Employees became sole owners of Cleveland Pneumatic Tool Co on Jan 27** by turning over $2.5 million down payment on its $11.8 million purchase price to Boston's Sixty Trust. The company will be owned by two employee profit sharing trust funds. The office employees' fund holding 51% of stock, and the factory workers' fund 49%. The company at present has a $90 million backlog of orders.

- **First large liquid-cooled generator** in the electrical industry's history will be built by G-E. Unit will include a 208,000-kw tandem compound turbine and a 260,000 kw-amp generator and will be capable of supplying electrical needs of 600,000 people. Liquid method permits manufacture of generator armatures with much higher capacity than present units.

- **Pressed Steel Car Co, Chicago, will make 155-mm shells** at W F & John Barnes Co's Rockford, Ill., plant. Pressed Steel will operate and manage the plant, which can produce 60,000 155-mm shells a month, and will shortly set up a second production line for 105-mm shells. Barnes Co will maintain the plant.

- **Canada's auto outlook is "much brighter" for '53,** says GM of Canada's president W A Wecker. Reasons: credit restrictions are off, supply situation is loosening, taxes are lessening, exports are up.

This will be a bumper year for new tooling of consumer products, predicts NTDMA president Alfred Reinke, who claims the trend toward consumer product changeover, particularly in the appliance and electronic products fields, will create the heaviest boom in tooling since the war.

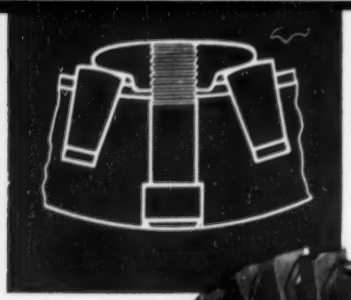
- **Styrene refrigerator boxes are "a distinct future possibility,"** according to Federal Telecommunication Laboratories. New styrene plastics combinations have structural strengths comparable to those of steel, Laboratory heads say.

- **General Motors is moving on plans to build off-the-road equipment** (super-heavy duty trucks for road-building, timbering, mining, etc.) Actual production is three to five years away, but machine tools will be needed sometime before then.

- **President Eisenhower will reorganize the National Security Council** to take over as top planning agency to fit defense needs into the national economy. Set up for the job in '47, the NSC fizzled for lack of topflight men. New A-1 staff may be headed by Robert Cutler.

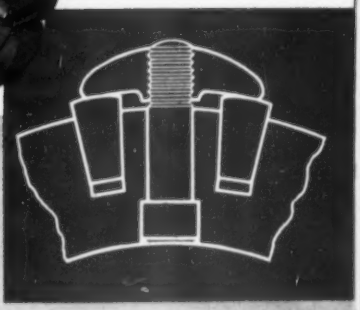
- **Quick precise measurements can be made of surface roughness in the shop,** field or laboratory with a new device known as the Surfagage which has been developed by General Motors Research Laboratories. The instrument has a single diamond stylus which is drawn across the surface to be measured, irregularities as fine as one million of an inch registering on the dial.

- **A plastic housing enclosing experimental type twin turbine torque converter,** filled with colorless oil and with thousands of tiny plastic balls, is used by General Motors to study flow patterns and to determine advantages of various blade designs. Movie camera shooting 7000 frames per second makes permanent record of experimental drives.



Continental Inside Cone Face Mill with illustration showing how blades are locked in the rugged body.

Continental Outside Cone Face Mill with illustration showing how blades are locked.



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Whether the job calls for inside or outside blades, you'll find that eight advantages of Continental Face Mills will bring lower tool costs on tough jobs:

1. *accurately machined* tapered blade slots.
2. *hardened bodies* to prevent slot mutilation.
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8. *practically-indestructible* bodies.

Blades can be furnished in any material specified and cutters can be furnished with any specified drive or with combination drives for American Standard and Ingersoll machines.

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33-33

Washington

Tax revision talk is in the air—and there's a good chance that the Congressmen will get around to a new study on depreciation policy.

Already Sen. Frear of Delaware has a bill in the works which would go a long way toward letting business set its own depreciation rates. Frear's bill would permit management to do this only for new plant and equipment—and would set limits on depreciation periods allowed, both maximum and minimum.

Businessmen have claimed that depreciation rates allowed by the Bureau of Internal Revenue have been too low. Proposals up to now have run into a couple of Washington roadblocks: high rates of capital expenditure by business made it clear that depreciation rates were not blocking business expansion; and continued federal deficits argued against any change which might reduce federal revenues, even temporarily.

Back in the 1930's, government depreciation policies were almost the opposite of what they are now: depreciation rates were fixed by the individual company—and BIR disallowed only those that they found 'way out of line or clearly "unreasonable."

At that time, depreciation rates on productive property ran about 10% a year. Now, rates are in fact set by BIR, and it's up to the businessman to prove—if he can—that BIR's rates are unreasonable. So now tax writeoffs run around 6 to 8% on the average.

All this may get a new boost in view of the GOP's number one domestic objective for the next four years—keeping the economy on an even keel. As things stand now, there's fear of a future dropoff in business investment in plant and equipment. Faster writeoffs for machinery and equipment could be a measure to prevent any such decline.

The problem may get an airing this year. But chances are now that any real legislative remedial action would not come until 1954. If signs of a turndown should materialize, Congress will be especially sensitive to such proposals with an election coming up in the fall of 1954.

• • •

The highly-heralded Washington Conference on Natural Resources Policy which was to be held this March under joint White House-Resources for the Future, Inc, sponsorship, has been called off until the fall.

Top business, farm, labor, and conservation leaders were to have thrashed out the controversial Paley report on the long-range US materials outlook.

Eisenhower's advisors asked for the postponement. They had previously given stout support to the Conference, allowing RFTF (a Ford Foundation-subsidized research outfit) to use Eisenhower's name. Now that they're in the White House, the GOP crowd wants to hold off until it gets its feet on the ground more firmly on natural resources problems.

Behind the postponement is a charge by US Chamber of Commerce that RFTF is run by New Dealers and professional conservationists, who have stacked the conference agenda against business. Industry leaders are out in the cold as far as conference planning is concerned, according to this charge.

• • •

There may be a way out for Alcoa in its bottled-up plan to build a $400 million aluminum smelter-hydro power project at Skagway, Alaska. But it'll involve concessions by the US government.

Alcoa is now stalled by Canada's refusal to allow diversion of Yukon waters into Alaska to power the aluminum smelter. But Washington insiders believe the Canadian government would reconsider in return for (1) a US contract to buy Canadian aluminum for the stockpile, (2) lifting of the 1½ cents a lb tariff on aluminum, or (3) US participation in the St. Lawrence Seaway.

• • •

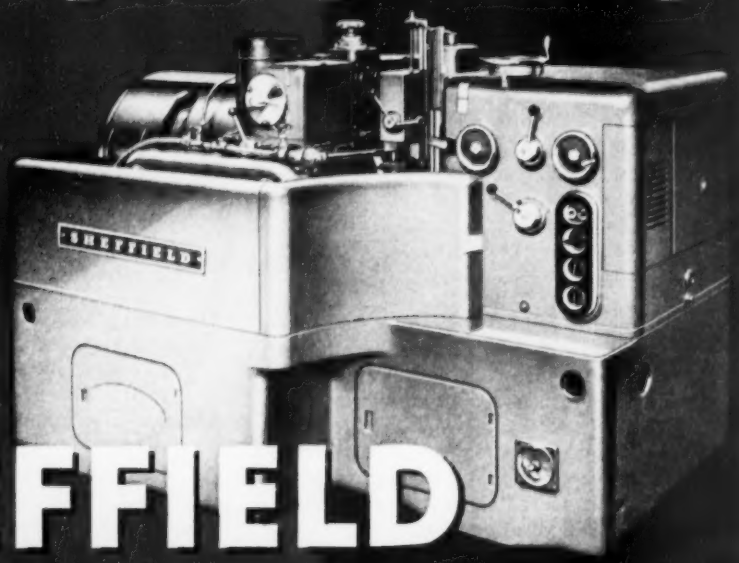
Washington doesn't look for any major labor trouble until the basic steel contracts reopen July 1 on a general wage increase only. Walter Reuther's implied threat to strike the automobile industry on March 1 isn't taken seriously by government officials.

CIO will not be satisfied with Taft-Hartley, no matter how much it is amended. Even so, Walter Reuther, new CIO president, will propose some amendments. Main CIO target: 80-day injunction national emergencies. Reuther wants to eliminate the injunction completely. He also wants to write a clear definition of "national emergency" so that it won't cover a strike at a single plant.

For example, Truman invoked an 80-day injunction against the CIO Steel Union strike at American Locomotive Co's Dunkirk, NY, plant—the only source of special pipe needed in atomic energy construction. Reuther criticized: "If our atomic energy program is dependent on the output of a single plant employing only 1500 workers, that's poor planning."

Eisenhower administration will put T-H revisions in the hands of Congress. Taft will thus have the big say in GOP labor policy. He wants to retain bans on secondary boycotts and the closed shop, and hang on to Taft-Hartley's emergency anti-strike injunction.

a new contribution to gear grinding



by SHEFFIELD

Here, now, are two new opportunities in the making of gears—

(1) To grind high precision gears up to 8 DP at mass production rates and greatest economy.

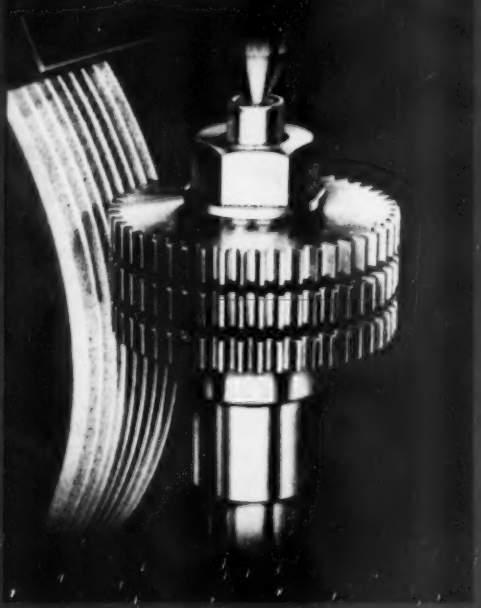
(2) To grind high precision gears in multiple, directly from the solid gear blank.

The cycle is continuous and automatic — no indexing. Both spur and helical gears (up to 45° helix) are ground with equal speed and facility.

Gears of varying diameter, but having the same DP can be processed with the same machine setting merely by varying grinding wheel position and an easy substitution of change gears for varying numbers of teeth.

The gear teeth are generated by a precision "Crush-true" and diamond dressed wheel which has a helical rack form.

The many possibilities and features of the new Sheffield No. 140 Precision Gear Grinder are outlined in Bulletin 140-53. Ask your Sheffield representative for it or we'll mail yours from here.



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GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS • CONTRACT SERVICES • THREADING TOOLS

Detroit

Detroit has drawn one or two solid conclusions from the GM Motorama, which opened in New York in mid-January.

Conclusion One: The day of the American sports car has dawned. Enthusiastic reaction to new sports cars shown in New York leaves no doubt but that they will become regular features in automaker model lines in the future. The aspect that intrigued Detroit was that people were coming up to GM attendants and asking when they could get deliveries—with rarely a query about price. Reaction was at least as good as that which greeted the hardtop coupe when it broke into the lineup a few years back.

Motorama Conclusion Two: The warm response to the showing of experimental-type "dream cars" is a logical prelude to pronounced changes in body styling in the years ahead. Traditionally, Detroit moves slowly on design development, following orthodox lines that have proved themselves by customer acceptance in years past. There will be less reluctance to move forward stylewise now. It would be logical to expect a continuation of large body die programs in future years.

GM "dream car's" plastic bodies comprise an area of considerable exploration at this time. During the last six months there have been notable advances in plastic-impregnated materials—to the point where every auto maker is seriously studying physical strengths, costs, etc, with a view to use for parts on limited quantity runs—maybe custom bodies or the like. Right now it takes too long and requires too much equipment, regardless of costs, to use plastics for long automotive-type runs (remember the problem body builders ran into years ago when they had to set bodies aside for weeks to dry out after painting?). That's the phase researchers are trying to lick.

• • •

Plastics bring to mind the fact that another family of these materials is being used in die applications. Dodge got off on the wrong foot with word last fall that it was using a plastic die to shape steel panels for trucks. It's the same phenolic used so much in aircraft practice, toughened up and backed by boiler plate for better impact resistance. Other companies are either using similar dies or making test studies. You'll hear more of this later.

• • •

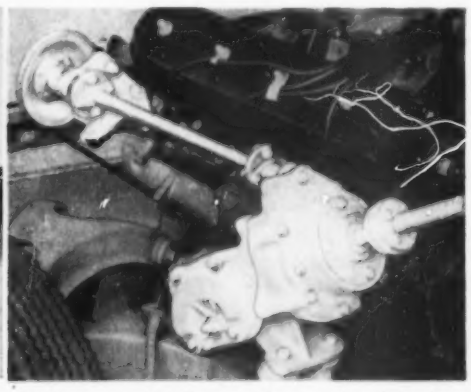
Companies ordering machine tools are gradually getting improving promises from the machinery makers. Deliveries, too, are more in line with expectations—fewer disappointments.

• • •

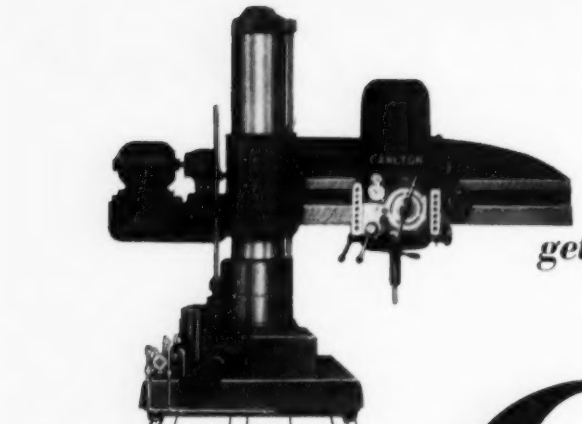
Auto production is currently at a heated pace—up around 150,000 a week—and bids fair to hold in that territory for a time. To get an idea of the large outlook for the industry, note that it plans to ship 18% more cars and trucks in the first quarter than it did in the first quarter of 1952. Shipments of vehicle parts will be up even higher—nearly 27% above comparable shipments in the same period last year.

Bullish attitude is further reflected in the efforts of one division of Chrysler Corp. In its first three months of production on '53 models, Dodge produced and shipped 100,000 cars. The entire 1952 production run totalled only 259,-519 units.

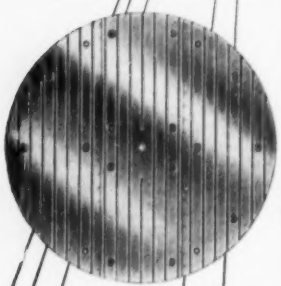
Too, Packard has put into operation a new production line for its medium-priced Clipper line. This is one of a number of manufacturing changes aimed at integrating production of Packard's two lines.



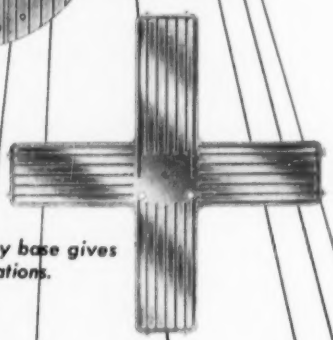
STUDEBAKER'S CONTINENTAL STYLING gets the once-over from company board chairman and president H S Vance. The '53 Champions and Commanders both feature the low, sweeping lines typical of European cars. New also this year is Studebaker's mechanical power steering unit (right), optional now on the Commander and Land Cruiser, and later this year on the Champion. Power unit on steering gear contains two multiple-disc clutch assemblies rotating in opposite directions. One clutch provides power for left turns, other for right turns.



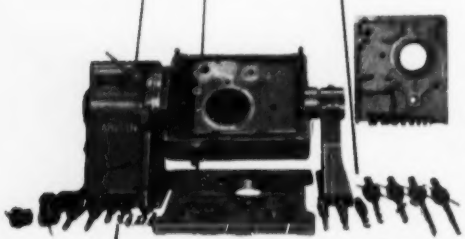
Track-type mounting for long, straight sweeps.



Full round base gives ample space for large work pieces.



4-way base gives four work stations.



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Machine Tools

Around $200 million of machine tool orders for defense tooling is reported hanging fire. No one seems sure, however, as to how soon this business may be placed.

The sweeping changes in Washington personnel undoubtedly have something to do with the uncertainty. Whether new policies will be formulated or old policies reaffirmed is yet to be decided. Meanwhile nothing much is being done.

• • •

Ford's program for jet engine production at Chicago is the biggest single tooling project in the active stage.

Ford has distributed orders for about 1150 machine tools and accompanying jigs, fixtures and gages. They will be used for pilot-line production of Pratt & Whitney's J-57 engine for the Air Force.

This is only the beginning of a program that will total an estimated $50 million for new tooling. Some machines formerly on the reciprocal-engine line at Chicago will be retooled for the jet-engine job.

The reciprocal engines will "phase out" as production of jet engines is built up on a schedule calling for full output of jets by February, 1954.

• • •

The Air Force has cancelled some prime contracts for materiel. But it has not cancelled the machine tools for these projects.

It would like machine tool builders to keep these machines on their order books but move them down to a less urgent spot. This hardly can be done legally, as the orders have a priority rating which gives them a certain preferred status.

The suggestion probably will be made to the Air Force that it put deferred delivery dates on these orders as a solution.

• • •

New machine tool orders in December are put at 223.4 on the index of the National Machine Tool Builders' Association. That is a gain over 205.4 in November.

December shipments were at 351.8, as against 342.5 the previous month. Backlog represents about 10-months' business.

Cancellations still are high. In November they were 18.1% of new orders. Foreign orders sank to a new low of 8% in December.

A mission of 10 U.S. engineers and technical experts, recruited by George Frye Associates, Chicago, has been in northern Italy since about November 1 to help the Italian machine-tool industry increase its efficiency. The mission is sponsored by the Mutual Security Administration.

This team is going into such problems as rationalization of production, productivity, markets and labor relations.

The Americans intend to stay six months. During that time they will visit 20 or more Italian companies. Among other things, the mission will give lectures for the Italian managers, engineers and workers.

• • •

Productivity in the US machine tool industry is higher than in Britain, concludes the report of the Productivity Team representing the British machine tool industry which visited this country in 1951.

Reasons are: (1) Wider and better application of the science of "design for production"; (2) more realistic approach to accuracy and finish; (3) greater use of handling facilities; (4) better machinability of steels and cast iron used; (5) more accurate balancing of plant capacity and planned load; and (6) better servicing of machine operators.

• • •

For the long term, the British industry should reduce considerably the number of builders "by absorption, amalgamation or any such means that will allow greater standardization and concentration."

The British industry was urged to develop a system of "standardized unit" construction for the bulk of machine tools, "aiming at volume production of industry-wide common units for manufacture of low-priced simple machines."

The British government should arrange, in conjunction with the machine tool industry, to stockpile standardized units when general industry is not buying, the report said.

These units can be released when the demands of customers are greater than the machine tool industry can satisfy in the time required.

• • •

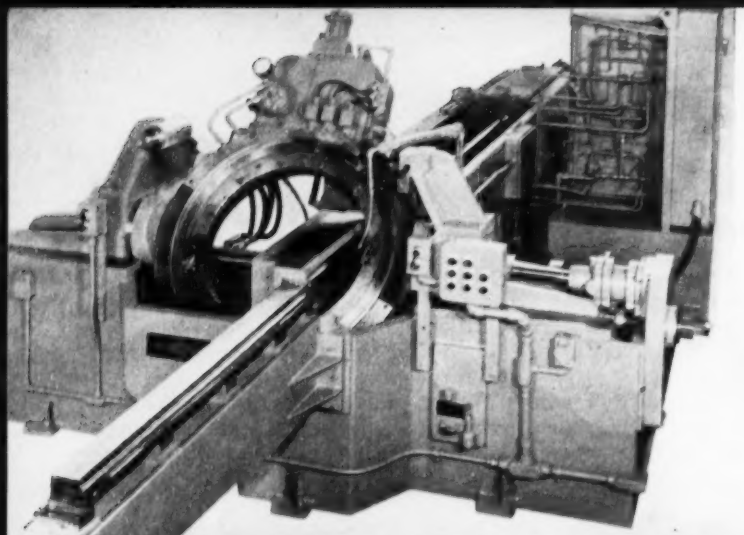
Unless they can increase their productivity, the report points out, the British will have trouble retaining their export markets.

Competition will come first from the Germans, but Russia might become a dangerous competitor.

Russia has decreed and is implementing a far-reaching rationalization of machine tool design leading to low production costs.

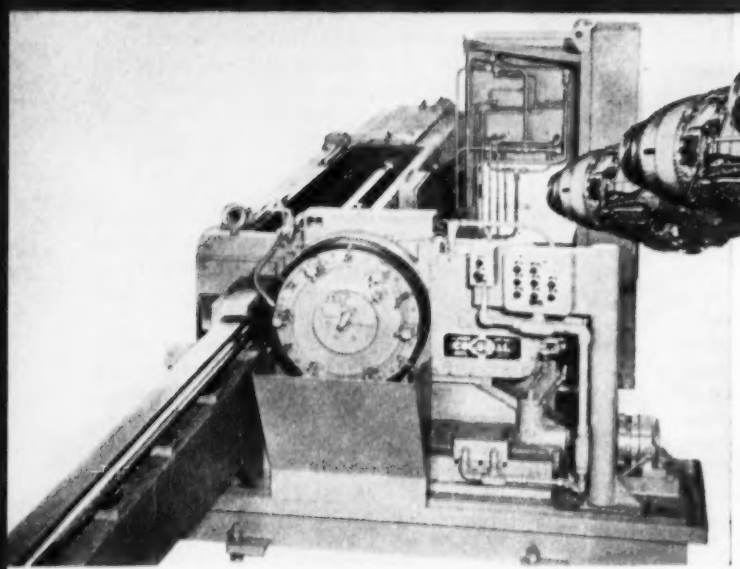
Copies of the 88-page team report can be secured from: Office of Technical Services, Department of Commerce, Washington, DC.

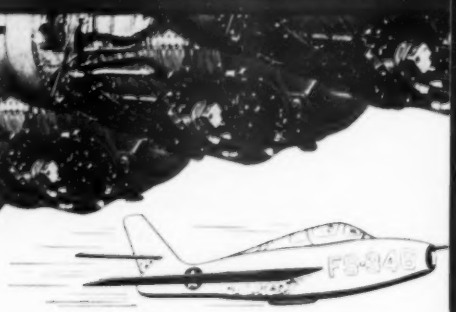
BF



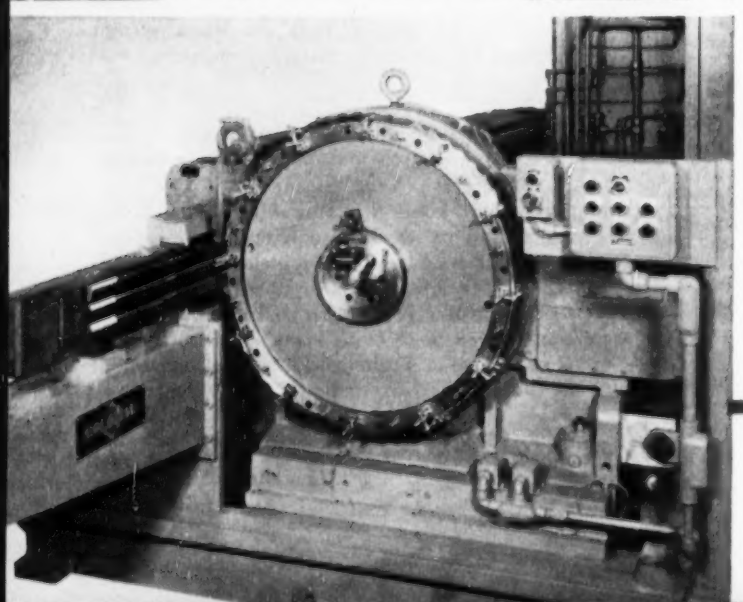
COLONIAL broaching machine, 10-ton 90-inch stroke horizontal, with trunnion fixture for angular adjustment. Shuttling, indexing, ram operation, and rapid return fully automatic, for broaching internal slots on Curtiss-Wright SAPPHIRE ring segments. Pneumatic part ejection manual control.

COLONIALS *in the Shop* MEAN

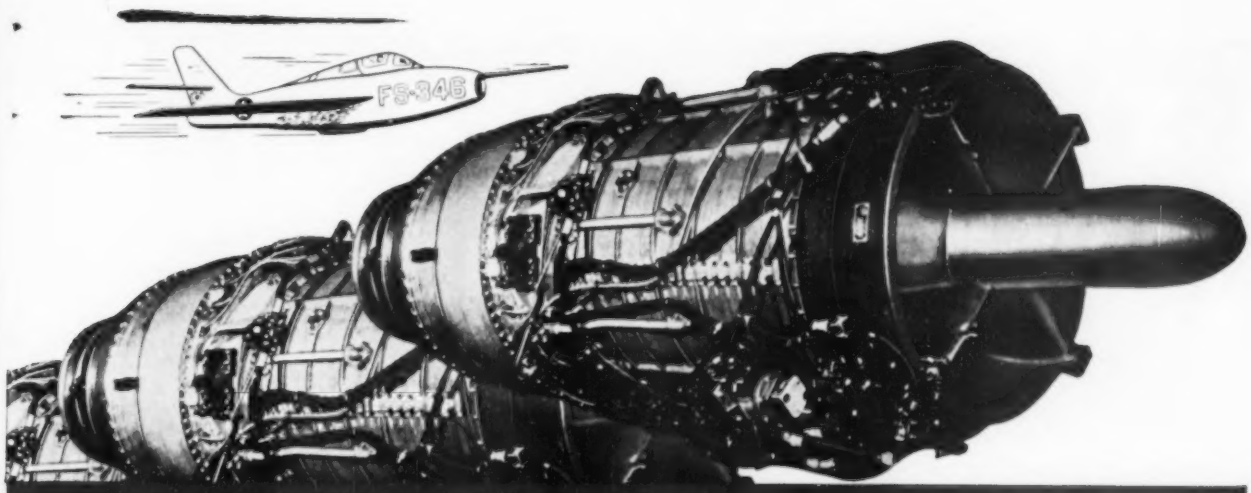




Another fully automatic COLONIAL 10-ton 90-inch stroke horizontal broaching machine broaches external slots on a SAPPHIRE jet engine part. Again, shuttling, indexing and ram operation are automatic, and part ejection is pneumatic manual control.

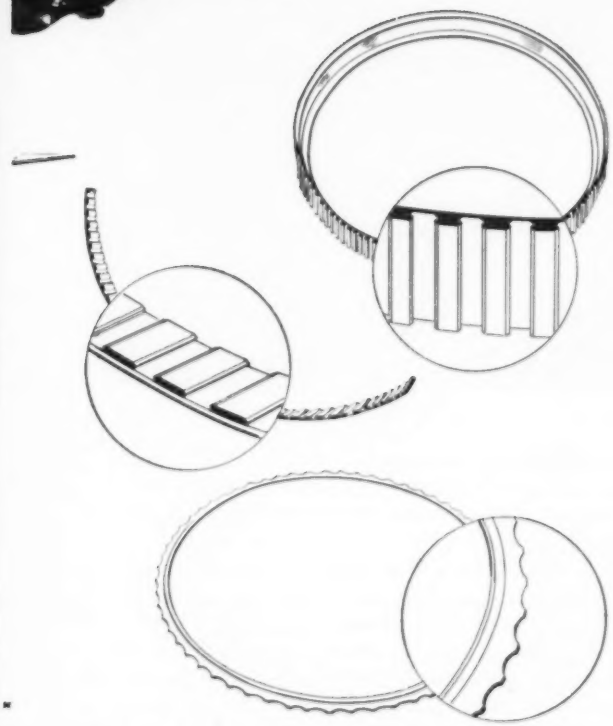


Three external scallops on this Curtiss-Wright SAPPHIRE part are broached automatically with each stroke of the ram, on this 10-ton 60-inch stroke COLONIAL broaching machine. Like the other machines shown, electrical controls permit individual operation of each function for set-up and tryout purposes.



CURTISS-WRIGHT

MORE SAPPHIRES *in the Air*



These drawings, distorted for security reasons, indicate the types of jet engine parts being produced automatically today on COLONIAL broaching machines with 'unified' broaching.

COLONIAL BROACH is proud to be a supplier of broaching machines to the Curtiss-Wright Sapphire jet engine program. This 25% more powerful jet fighter engine has gone into production in record breaking time, and record breaking production will be possible due to the high production accuracy of machine tools like the fleet of automatic Colonial broaching machines, complete with Colonial broaches and fixtures, working on this program.

"Always ready for flight" is the reputation established by SAPPHIRES at the Air Force's principal flight test base. "Always ready for broaching" is the reputation established by COLONIALS in leading production shops of America. This reputation can be traced to Colonial's 'unified' broaching, made possible by designing and producing the broaching machine, the broaches, the fixtures, and the automation, all in Colonial's own plant, and all serviced by Colonial in the production shop.

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13

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THE RESULTS: Production is 650 to 700 ends per hour—a substantial increase over output with previous oil used. It is not unusual for threading dies to be ground only once a week.

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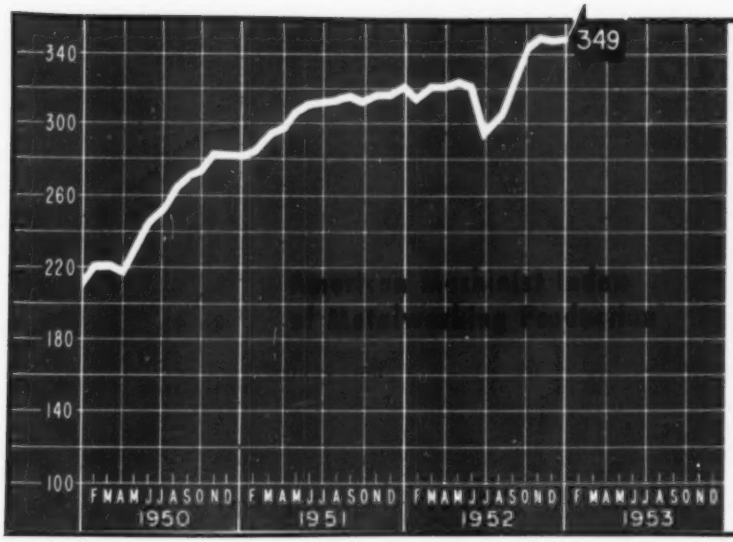
Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	JAN '53(*)	DEC '52(p)	NOV '52(r)	DEC '51
	358	**362**	**353**	**318**
Machinery	**331**	**320**	**320**	
Electrical Machinery	**417**	**405**	**362**	
Autos	**273**	**270**	**219**	
Other Transportation	**588**	**573**	**487**	
Other Metalworking	**358**	**354**	**316**	

(*) Estimated (p) preliminary (r) revised

Metalworking operations are rolling along very close to the postwar peak as the new administration gets going.

There is no reason to believe that they will go off abruptly in the near future. First quarter production will be close to setting a record.

It will be markedly higher than the first three months of last year, on the basis of manhours worked.

• • •

Take a look at the American Machinist Index of Metalworking Production as a clue.

It is estimated to be at 358 for January (though accurate figures are not yet at hand).

December was at 362 and November at 349. January a year ago the index was at 315. It has risen a total of 47 points since then, and now is 43 points above where it was 12 months ago.

• • •

Defense, of course, is largely responsible for the better showing now. The plane industry's manhours went up 10 points within the past year.

The automobile and appliance industries are supplying some of the push, too. Auto output this quarter will be sharply above the same quarter of 1952. General Motors alone expects to build 900,000 cars and trucks in the January-March period.

Electrical machinery makers, with bulging backlogs, are running at a higher level than in the similar quarter last year.

• • •

Orders for malleable castings shot up 10% in January over December, but have been unevenly distributed. Business probably will stay where it is through the first half.

Most steel casting people are glad that unfilled orders have declined to less than 5 months at current production rate.

Only in heavy and large castings does the backlog stay high. Southern steel foundries are most affected by the drop.

Railroads, the steel casters' biggest customer, may step up their purchases this year.

• • •

Steel supply is gradually easing. Every week a few more steel items are in balance (production matching orders).

Alloy steels and items going directly into defense products, such as shell, remain tight and are likely to stay that way a while.

January steel orders were very heavy. But that is to be expected, as customers try to replenish their inventories.

Demand is strong for sheet and plate and forging stock over 2 inches. Wire and bolts and nuts are in good supply.

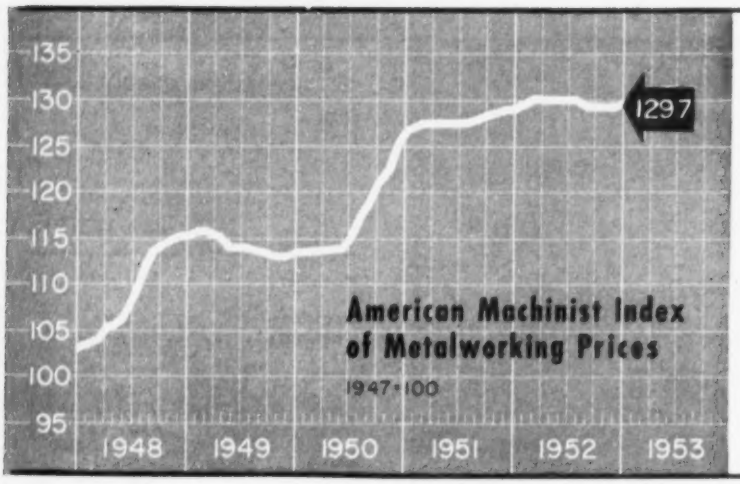
• • •

Construction machinery people, including heavy tractors and earth-moving equipment, are sure that production will be pegged at or close to last year's lush level up to the final quarter of '53.

Buying resistance is cropping up, however. Sales may start to slide off soon. Price rise is unlikely if controls are removed.

Government sales of construction machinery were lower in 1952 than in 1951. They promise to go off still more this year.

Gaging Business



PRICE INDEX

	JAN '53(*)	DEC '52(p)	NOV '52(r)	DEC '51
	129.7	**129.6**	**129.5**	**129.1**
Metalworking Machinery	137.7	137.7	137.2	
Other Machinery exc. Electrical	132.3	132.2	132.5	
Electrical Machinery	124.4	124.4	126.8	
Fabricated Metal Products	128.1	128.0	126.6	

(*) Estimated (p) preliminary (r) revised

Industrial prices are firming up. Increases in nickel and aluminum, combined with current high output in manufacturing, suggest future price boosts in industrial products.

Many items are below ceilings, so some leeway exists for upping prices. If controls should be lifted at the end of April, there is a good chance of an upward spurt.

• • •

Cost-of-living index in December was down a bit from November. But a seasonal upswing may be here already.

A new base period—1947-1949—has been set up for measuring living costs. Index figure, on new basis, was 114.1 in December. It was 191 on old basis of 1935-1939 equaling 100.

• • •

Manufacturers' inventories did not go up in November, for the first time in many months. Soft goods industries were responsible for this change.

Durable goods makers' stocks rose $200 million, the gain centering in the aircraft and automobile industries. Food and textiles pulled down the average over-all.

• • •

Manufacturers in general are getting caught up with orders. Backlogs have been whittled down considerably, as sales slid off and production stayed unchanged or rose.

Latest figures show that the drop in unfilled orders has been most pronounced in the durable goods industries. They previously had been shaken down in the soft-goods lines.

• • •

Layoffs have been at a record low. Only eight out of every 1000 workers were idle during November. That is half as many as the previous year.

Personal income is believed to have risen to a new peak in December. Guess is that it was around $280 billion.

Non-agricultural income has gained recently.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	251.5	249.3	234.6
Steel ingot operation (thousands of tons)	2,234	2,238	2,065
Electric power output (million Kilowatt hours)	8,121	8,185	7,540
Production of automobiles and trucks	148,718	139,620	98,669
Engineering construction awards (*Eng. News-Record*—millions)	$229.1	$548.8	$309.3

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1935-1939 = 100)*	234	233	218
Index of durable manufactures production (1935-1939 = 100)*	305	300	282
Durable goods manufacturers' sales, millions*	$11,699	$11,968	$10,710
Electrical machinery manufacturers' sales, millions*	$ 1,228	$ 1,205	$ 1,047
Other machinery manufacturers' sales, millions*	$ 2,088	$ 2,068	$ 1,997
Durable goods manufacturers' new orders, millions	$11,390	$11,772	$11,820
Electrical machinery manufacturers' new orders, millions	$ 1,256	$ 1,324	$ 1,346
General machinery manufacturers' new orders, millions	$ 2,007	$ 1,926	$ 2,146

* Seasonally adjusted

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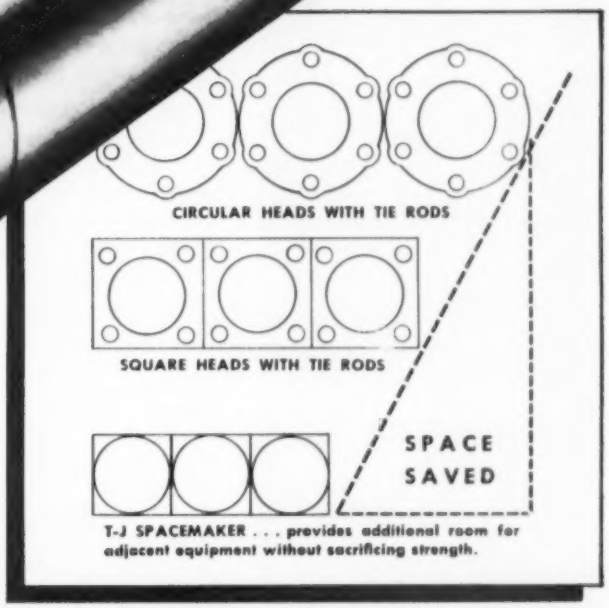
- SAVES UP TO 40% SPACE WITH NEW STREAMLINED DESIGN.
- SUPER STRENGTH . . . EXTRA HIGH SAFETY FACTOR
- SOLID STEEL HEADS
- HEAVY WALL, PRECISION HONED, HARD CHROME PLATED, SEAMLESS STEEL BODY
- LEAKPROOF CYLINDER HEAD TO BODY CONSTRUCTION.
- RELATIVE PORT POSITIONS MAY BE ROTATED WITHOUT DISASSEMBLY OF CYLINDER AND LOCKED IN DESIRED POSITION.
- HEAVY DUTY, HI-TENSILE, HARD CHROME PLATED PISTON ROD.



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

Streamlined construction of the new T-J Cylinders *eliminates tie rods . . . reduces head size . . .* and *saves up to 40% in mounting space!* In addition, a new high in strength is achieved with solid steel heads and heavy wall seamless steel body . . . leakproof construction . . . extra high safety factor.

Cylinder walls are precision honed and hard chrome plated for long-life efficiency. Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . both cushioned and non-cushioned . . . for wide range of pushing, pulling, lifting, clamping or control jobs. T-J dependability. *Fast delivery* to meet rush requirements. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.

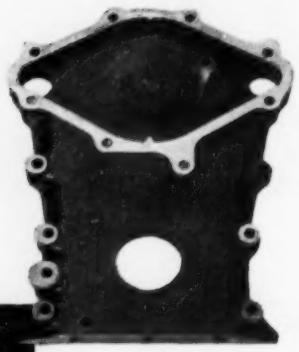
37 YEARS EXPERIENCE

Many More Advanced Features!

T-J TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

what's your time estimate on this job?



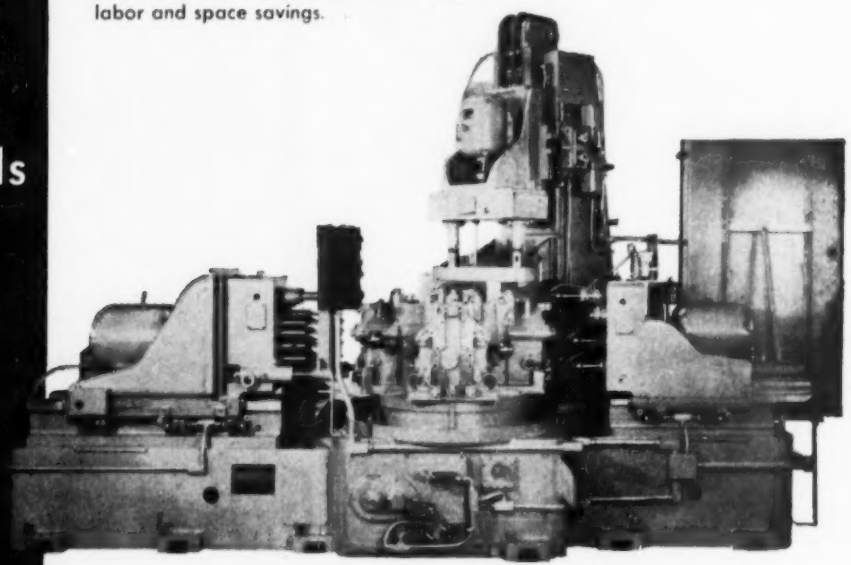
DRILL	19	HOLES
ROUGH BORE	2	HOLES
FINISH BORE	1	HOLE
CHAMFER	7	HOLES
REAM	1	HOLE
TAP	6	HOLES

Morris MOR-SPEED

Finishes One Part Every 33 Seconds

Machining a front cylinder cover for a popular make automobile engine, this four-way MORRIS Machine performs a two-cycle operation, and is production rated at 110 parts per hour at 100% efficiency. A total of 34 spindles do the operations listed above.

If your work requires numerous drilling, reaming, tapping and boring operations on a mass production basis, consult MORRIS Engineers. They will gladly show you case history proof of time, money, labor and space savings.



"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

Callaway MOR-SPEED Line

Morris

THE MORRIS MACHINE TOOL COMPANY
933 HARRIET STREET CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

GM's Kind of Thinking and Doing

The days of stiff competition are back again. General Motors, for one, knows it.

It has just staged an automobile show of its own in New York—the Motorama. It is the first since Korea and the most elaborate and glittering in history.

Don't overlook its significance. "It represents the most ambitious attack on progress through change General Motors has ever attempted," to quote GM board chairman Alfred P Sloan.

General Motors, as big as it is, thinks that it is not doing as well as it should. It wants to regain its former ratio of 47% of the passenger car market. It has designed its 1953 models and "tuned up" its distributing organization with that objective in mind.

IT HASN'T STOPPED there. It let Motorama visitors take a peep into the future by showing so-called "dream cars" of radical design. It did not keep these startling style developments under lock and key, with a guard at the door.

If there is any current demand for the dream cars. General Motors will make some of them. What's more, the first 200 to 300 probably will be built with glass-fibre-reinforced plastic bodies. General Motors believes in pioneering in new things.

GM top management, at the Motorama, revealed what its future policy will be. It is committed to annual model changes and to annual shows. It believes in improving its products continuously and then selling them hard.

"THE IMPORTANCE of continuing progress based on science and technology is not well enough understood," Harlow H Curtice, GM acting president, said at a New York luncheon. "It is the keystone of our modern society. It is the foundation upon which our prosperity and increased standard of living rests."

The Motorama once again focuses attention on the uninhibited and commendable practices of the automobile industry in not being afraid of change. Whenever it finds something new that is better than the old, it discards the old. In that search it spends prodigious amounts for research and development—in materials, in production techniques, in car designs.

WE COMMEND *to* other metalworking industries the automobile industry's kind of thinking and doing. True, many of these industries do not have as glamorous products as automobiles. Even so, the basic principles upon which General Motors moves forward still apply.

Burnham Finney

Write for this NEW and Comprehensive 72-page PRESS BRAKE catalog

- Applications of Press Brakes
- The Cincinnati Line of Accurate Press Brakes
- Cincinnati Standard Features
- Important Fundamentals in selecting a Press Brake
- Specifications and Dimensions of Cincinnati Press Brakes
- Filler Blocks or Die Holders
- Special Features
- Punching Equipment and Dies

The latest features and developments in the extensive line of Cincinnati Press Brakes are thoroughly covered in this new catalog.

Many varied operations in industry are illustrated. They may suggest applications that bring new economies and increase production in your plant, as they have in many plants throughout the country.

On your request, we will promptly mail to you, the new Press Brake Catalog B-4. A

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

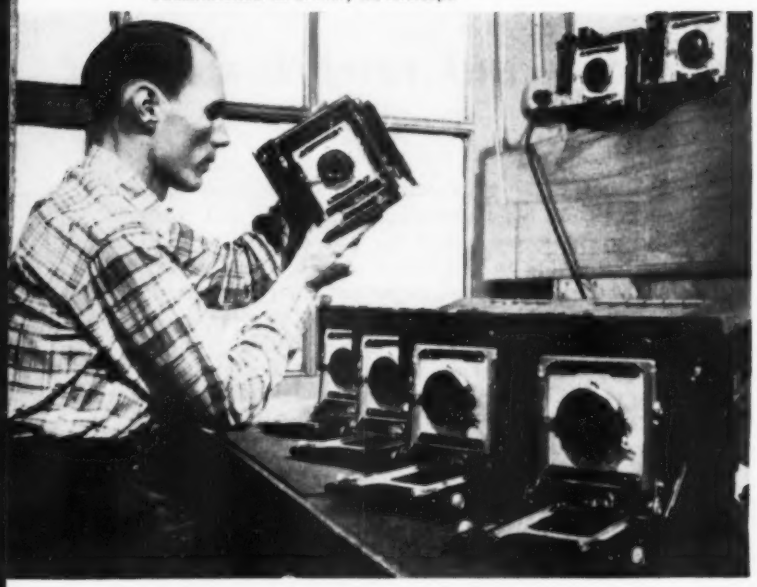
every man his own inspector...

every foreman his own boss...

AT GRAFLEX

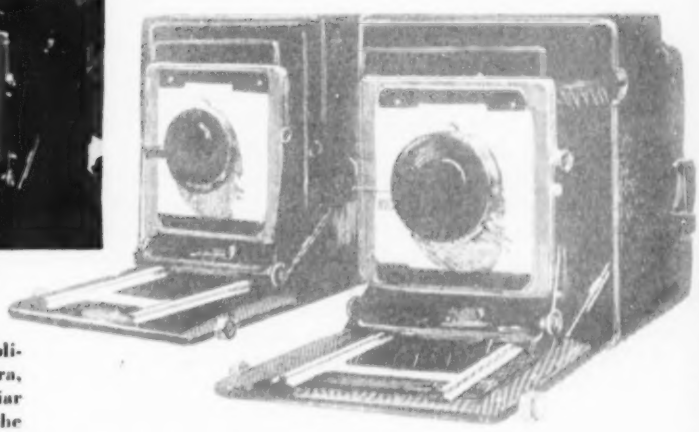
By E J TANGERMAN, Executive Editor

COLLIMATING an artillery BC telescope



SETTING INFINITY STOPS and applying accessories to Graphics

THE GRAFLEX STORY



Increasing emphasis on the quality photograph in publications of all types has made the Speed Graphic camera, and its maker, Graflex, Inc, of Rochester, N Y, familiar to many people. Because we use Speed Graphics for the pictures we take on *American Machinist*, we were particularly interested in this opportunity to visit the company's two plants, selecting from hundreds of operations for a photographic report those we felt were of interest and use to our readers.

Characteristics are precision, small-lot production, inspection by operators rather than inspectors, full freedom of action by foreman, excellent methods work, tool control, and production engineering, and first-class housekeeping.

Photographs were taken especially for this Report by Jim Burns.

American Machinist SPECIAL REPORT NO. 328
TO THE METALWORKING INDUSTRIES

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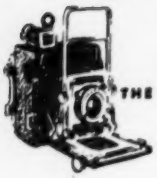


THE GRAFLEX STORY

ONE TELESCOPE EQUALS ONE FORD . . . *"Heart" elements of a new type of military telescope are these ranging and azimuth optical systems, each consisting of a reticle lens with prisms and two six-lead screws and nuts operating without backlash to move the reticle in two dimensions. The finished telescope costs as much as a new Ford. These units typify the quality of workmanship and precision required in military telescopes*

how scrap and rework were

Graflex is a familiar name to press and professional cameramen, a leading source of cameras, film holders, enlargers, and flash guns. It is known to industry for personnel-recording and microfilming cameras, to telephone companies for message-recording cameras, to amateurs and hobbyists for 35-mm, reflex, pack and roll film cameras. To the Air Force and Army, it is a leading source of combat cameras, and of aerial cameras since the first one was developed by William Folmer, founder of the company, to be hoisted by a kite in 1903, the year the Wright Brothers flew at Kitty Hawk.

Yet Graflex, as such companies go, is small. Indeed, back in the black days of 1932, the then 6-year-old corporation (reorganized from a company founded in 1890) had fewer than 100 employees. Now it has about 850 on the payroll, and equals its total 1932 sales every two weeks. As a camera maker, it produced military equipment for both World Wars; is currently turning out the new Signal Corps 70-mm combat camera, impervious to dust, light, fungus, moisture, and driving rain, and costing about $600—or over $1200 with full equipment. It is also producing artillery telescopes and aiming devices, so that half its current production is military. The other half includes familiar models, plus a new "22" reflex for amateur use, and others under development.

At first glance, Graflex is like any other precision-equipment plant, spotlessly clean, meticulous in inspection, working a bewildering array of parts in small lots rather than quantities, holding close tolerances, using little specialized equipment but many skilled employes. Indeed the main plant is a multi-story building in a crowded area of Rochester.

But there are several important differences. In the first place, there are no "employees" in this family-operated business; everyone is a "member" of the organization. There are extensive worker-participation organizations and the most up-to-date benefits, but this isn't the source of the cooperative spirit, as much as is a deep-seated sense of individual responsibility. And this isn't an industrial-relations dream—every superintendent and foreman runs his own area. Machining areas have their tool and gage cribs, every worker does his own inspecting and gets paid for it.

To begin with, the Production Engineering Department has full control of engineering specifications, from drawings to methods—in fact, the head of the department is a former methods man. This department also supervises quality control—but the control of quality is in the hands of the foreman and the worker. But more about that later.

The Methods Department has the normal organization, too, being subdivided into tool design, planning, toolroom control, and maintenance and storage of tools. But the methods sheet is also a production work order and is issued by the planning section. It is accompanied by a blueprint that contains no descriptive terms unless the process or method is absolute—such as "die casting," "weld," or "braze."

COLLIMATING CAMERAS is one of the final jobs just before shipment. It is done both with a collimator (left) and by focussing on the scene outside the plant, "the most frequently photographed scene in the world"

halved in one year

JOB DESCRIPTION — FOREMAN

(Tentative — arrived at as the result of discussions during several Supervisors' meetings)

A Foreman represents his Department Superintendent in all matters and actions which take place in the departmental section under his direct supervision. As such a representative, his prime duty is to supervise the production of a specified quantity of a product or part, to obtain or exceed the specified quality at the lowest practical cost, and to guard the safety, health, and welfare of all those individuals who are performing this work under his jurisdiction, while acting within the established system of the department.

A Foreman should be familiar with all of the operations performed in the section for which he is responsible, and must have leadership qualities with the ability, background and cooperativeness essential properly to guide and direct the efforts of others effectively and harmoniously.

A Foreman is responsible for the care and use of all tools, equipment and machines as well as the utilization, handling, and disposition of materials, parts and products in his area. He must direct the maintaining of satisfactory housekeeping in his area, including the timely disposition of rejected parts or assemblies either by repair or by transfer to Salvage. He is responsible for planning the work of his section within the framework of the over-all department planning as established by his Department Superintendent in conjunction with the Planning and Scheduling Department, the use of proper inspection facilities and procedures for maintaining quality, the keeping of adequate records, the meeting of schedule dates, the assignment of personnel, machines, tools, materials and equipment necessary for each job, the application of proper standards and methods procedures, and the control of costs.

A Foreman is responsible for the direct supervision of all personnel in his section, including the training of Members. He makes recommendations to his Department Superintendent on such subjects as promotions, rate increase, disciplinary action, layoffs and discharges. He is responsible for observing production and personnel problems as they arise and for correcting them within his section, if practicable, or with the assistance of his Department Superintendent, if necessary, and for the proper use of an established follow-up procedure to assure the quickest and most satisfactory solutions practicable.

A Foreman must administer and respect the policies and prerogatives of his Department Superintendent, other management groups, sections, and departments as applicable to his own section. He should constantly seek out and develop those under his direct supervision who have potential leadership qualities, and should remain continuously alert for opportunities to improve the morale, efficiency, versatility, and quality-consciousness of each Member as an individual and of the group as a team.

4-15-52

JOB DESCRIPTION — SUPERINTENDENT

(Tentative — arrived at as the result of discussions during several Supervisors' meetings)

A Department Superintendent represents management in all matters and actions which take place in the area under his direct supervision. As such a representative, his prime duty is to supervise the production of a specified quantity of a product or part and to obtain or exceed the specified quality at the lowest practicable cost.

A Superintendent should be familiar with the operations of the department for which he is responsible and must have leadership qualities with the ability, background and cooperativeness essential for proper supervision of people.

A Superintendent is responsible for all material and equipment in his area. He is responsible for the over-all production planning for his department, the availability of adequate inspection facilities for maintaining quality, the keeping of all necessary records, the meeting of schedule dates, the assignment of personnel, machines, tools, materials and equipment necessary for each job, the care and operation of machines, tools and equipment, the application of proper standards and methods procedures, and the control of costs.

A Superintendent has over-all responsibility for the supervision of personnel in his department and for the training of members in that area. He is directly responsible for the interviewing and selection of prospective members; the indoctrination of new members on company policies; promotions, rate increases, disciplinary action, layoffs, and discharges. He must guard the safety, health and welfare of those working in his area. He is responsible for observing production and personnel problems as they arise and for correcting them within his department, if practicable, or through the assistance of other appropriate departments, if necessary, and for maintaining an adequate follow-up procedure to assure the quickest and most satisfactory solution practicable.

A Superintendent must administer and respect the policies and prerogatives of other management groups and departments as applicable to his own department, such as Methods, Engineering, Standards, Planning and Scheduling, etc.

A Superintendent must continually seek to develop in his foremen those qualities that are necessary for successful and efficient supervisory work. In addition to their general responsibilities and authority, he will establish for them such additional responsibilities and authority as may be needed. He should instill in his foremen the need for their seeking out and developing under their immediate supervision those who have potential leadership qualities, as well as for developing all others for the purpose of making them more capable as individuals and at the same time more valuable to the Graflex Organization.

4-15-52

RARELY IS IT POSSIBLE to describe supervisory jobs. These job descriptions were issued April 15, 1952, to cover the work of superintendents and foremen. They were prepared by the supervisory group at regular meetings

MANUFACTURING SCHEDULE — GRAFLEX, INC.

MAT'L CODE NO.	PART NAME	ORDER NO.	ORDER QTY.	PART NO.
	Housing M-65 Item 45			C5582532-5
MAT'L PER 100	MATERIAL	ORDER DATE	FINISH DATE	SHEET / OF
	Bronze Casting Comp. 2 (Spec. QQ-B-691).			1 / 9

OPER. NO. & DEPT.	DESCRIPTION	EQUIPMENT	SCHEDULED START	SCHEDULED FINISH	QTY.	NO. OF CONT.	DATE AND SIGNATURE
5 Rec. Insp.	Inspect casting as purchased.	Patt. Equipment					
10 MH	Mill bottom mounting face. Operator to file burr & inspect during machine cycle.	1-18 Cinn. Mills Mill Fixt. T1-C5582532 Cutters-Std.					
15 MH	Mill face to .906 dim. Operator to file burr & wash during machine cycle. Gauge 1 in 15 pcs. during machine cycle.	1-18 Cinn. Mills Mill Fixt. T2-C5582532 Cutters-Std.					
20 MH	Mill .375 slot for strip & burr. Gauge & burr during machine cycle.	1-18 Cinn. Mills Mill Fixt. T2-C5582532 Cutters-Std.					

METHODS SHEETS are printed 5½ x 10½-in. forms reproduced by multilith. The form itself is white, the duplicates yellow. Here is shown Sheet 1 of 9 on a bronze casting. From this form the production cards are produced

SALVAGE TICKET No. ST-15455

A B C

ITEM Shoe — PART MAT'L. NO. 5206446

USED ON M34 — SHOP OR PURCH. ORDER NO. 14001

DATE 11/20/52 — OPERATION NO. 12 — QUANTITY 100

AUTHORITY REFERENCE J. Jones — WEIGHT 17#

CAUSE AND REMARKS: — MATERIAL BRONZE

POROSITY

REWORK ☐ SCRAP ☑ RESPONSIBILITY

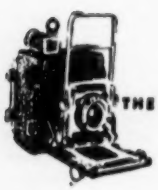
VENDOR

APPROVED AS SCRAP J. SMITH

	UNIT	TOTAL
MATL.		
LABOR		

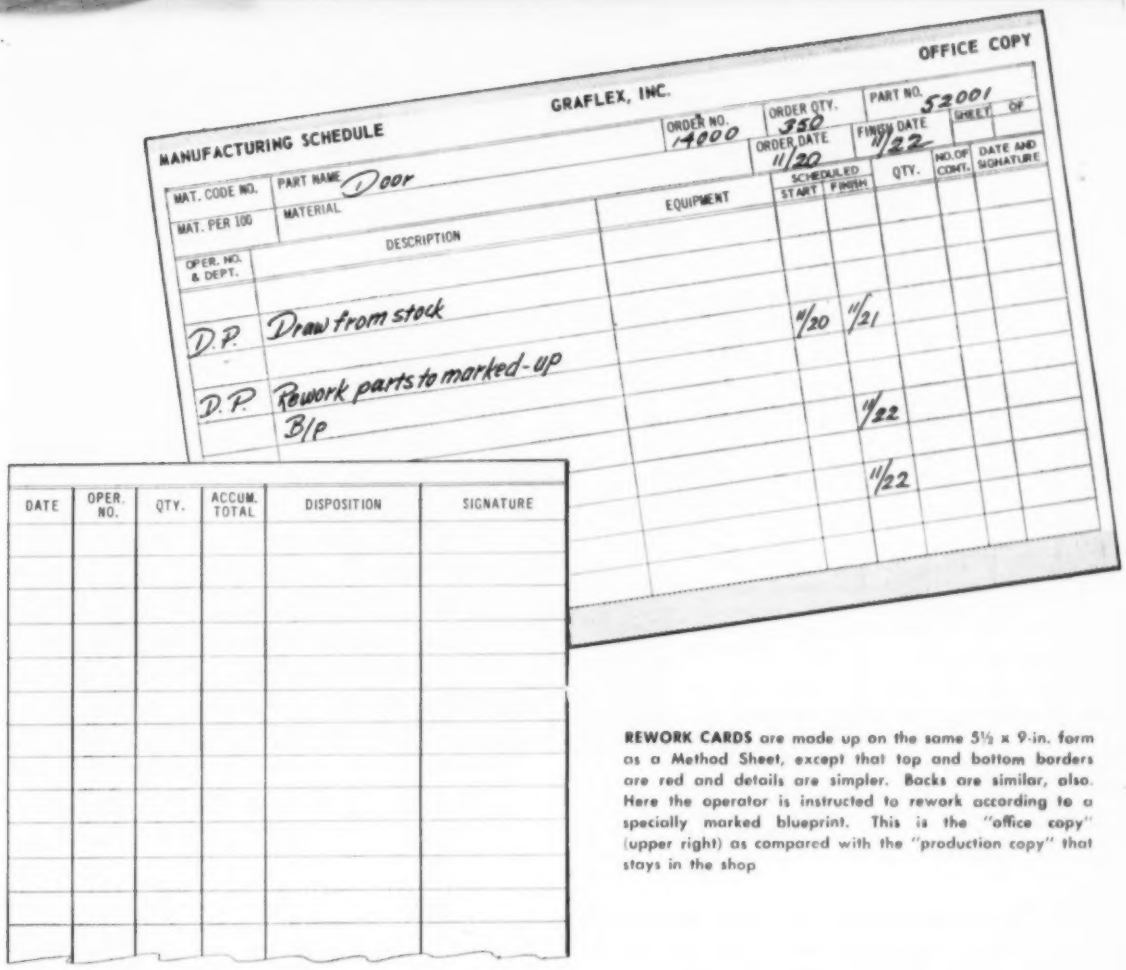
T. CLARK INSPECTOR

1



THE GRAFLEX STORY

SALVAGE TICKETS (pink— 6 x 8 in.) are made out on substandard work sent to the central salvage crib. Here the fault of a casting sent in is shown as porosity, scrapping is recommended, and responsibility shown as the vendor's. It is made up with three carbons, a yellow for Accounting, a green for Planning & Scheduling, and a white for file



MANUFACTURING SCHEDULE — GRAFLEX, INC. — OFFICE COPY

ORDER NO. 14000 | ORDER QTY. 350 | ORDER DATE 11/20 | PART NO. 52001 | FINISH DATE 11/22 | SHEET OF

MAT. CODE NO. | PART NAME Door | MAT. PER 100 | MATERIAL

OPER. NO. & DEPT.	DESCRIPTION	EQUIPMENT	SCHEDULED START	SCHEDULED FINISH	QTY.	NO. OF CONT.	DATE AND SIGNATURE
D.P.	Draw from stock		11/20	11/21			
D.P.	Rework parts to marked-up B/P			11/22			
				11/22			

DATE	OPER. NO.	QTY.	ACCUM. TOTAL	DISPOSITION	SIGNATURE

REWORK CARDS are made up on the same 5½ x 9-in. form as a Method Sheet, except that top and bottom borders are red and details are simpler. Backs are similar, also. Here the operator is instructed to rework according to a specially marked blueprint. This is the "office copy" (upper right) as compared with the "production copy" that stays in the shop

Sometimes, it is necessary to bore a hole rather than to drill it—that's the methods man's decision to achieve desired size and finish at lowest cost. The blueprint shows *finished* or *final* part dimensions; the tool designers and methods man must make their own allowances for coining, shaving, plating, paint buildup and like dimension-changes.

Further, there are no factory files of prints or methods sheets—the print and sheet issued with the job control that job and that job alone. Even a familiar part has such control—and changes are circled to flag them.

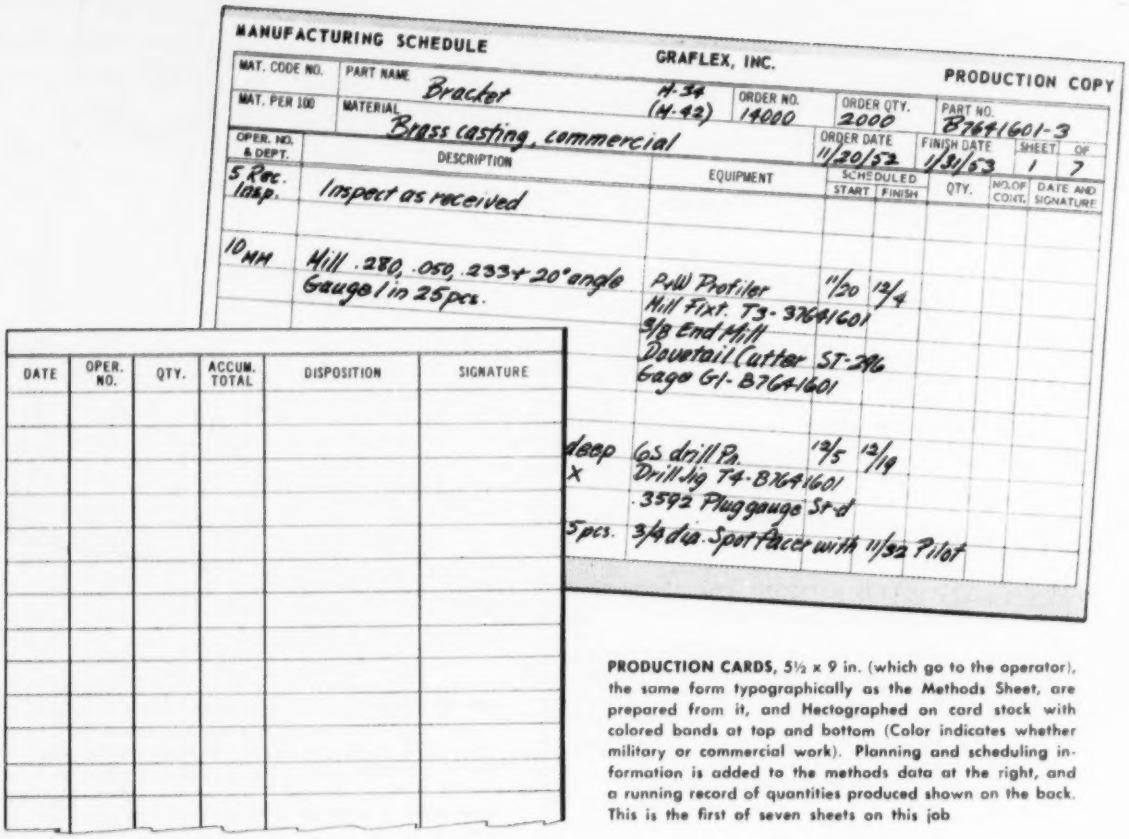
In 1949 Graflex made a radical step—it abolished the quality-control department, transferring some 30 inspectors to other work. The reason for the change was that the quality-control group, supervising receiving, parts, and final inspection, could control quality, but was only a police department; it could winnow out scrap, but not stop it at the source.

Under the present system, there is still a final-inspection department, reporting directly to Production Engineering. But all part inspection is done by the operator, who is held responsible for quality. In the two main machining areas, each foreman has inspectors who maintain the gage crib, and help the foreman on quality control. They have lead checkers, dial gages, comprators, master gage blocks, and similar control equipment. But they do not inspect regular production unless asked.

Each foreman handles 10 to 35 people; each superintendent has three or four foremen. There are six superintendents, one for each floor of the main building, one for the St James Street plant where screw machines, turret lathes, presses, the die shop and military assembly are grouped. The superintendent is responsible for everything in his area.

All production is on incentive, the system being a modified 100-point Bedeau. Allowances for inspection are included in all standard times, and methods sheets (see sample) specify the frequency of inspection and the gages to be used. Production cards (made up from the methods sheets) and blueprints are issued with the tools and gages for each job to the setup man. He sets up the job, alone or aided by the gage-crib inspector, then runs the first part and inspects it. If necessary, he instructs the operator, making sure frequency and method of inspection are understood, as well as proper care and maintenance of tools.

Once the operator has "punched in" on the job, the responsibility for quality is his alone. The setup man, roving inspector, or foreman is available for assistance if he needs it, but he must determine for



MANUFACTURING SCHEDULE — GRAFLEX, INC. — PRODUCTION COPY

MAT. CODE NO.	PART NAME	ORDER NO.	ORDER QTY.	PART NO.
MAT. PER 100	MATERIAL			
	Bracket	H-34 (H-42)	14000	2000	B7641601-3
	Brass casting, commercial		ORDER DATE 11/20/52	FINISH DATE 11/31/53	SHEET 1 OF 7

OPER. NO. & DEPT.	DESCRIPTION	EQUIPMENT	SCHEDULED START	SCHEDULED FINISH	QTY.	NO. OF CO'ST.	DATE AND SIGNATURE
5 Rec. Insp.	Inspect as received						
10 MM	Mill .280, .050, .233 + 20° angle Gauge 1 in 25 pcs.	P&W Profiler Mill Fixt. T3-B7641601 3/8 End Mill Dovetail Cutter ST-396 Gage G1-B7641601	11/20	12/4			
deep X	GS drill Pa. Drill Jig T4-B7641601 .3592 Plug gauge St'd		12/5	12/19			
5 pcs.	3/4 dia. Spotfacer with 11/32 Pilot						

DATE	OPER. NO.	QTY.	ACCUM. TOTAL	DISPOSITION	SIGNATURE

PRODUCTION CARDS, 5½ x 9 in. (which go to the operator), the same form typographically as the Methods Sheet, are prepared from it, and Hectographed on card stock with colored bands at top and bottom (Color indicates whether military or commercial work). Planning and scheduling information is added to the methods data at the right, and a running record of quantities produced shown on the back. This is the first of seven sheets on this job

himself if prescribed quality is not being maintained and must reject and isolate parts that are outside tolerances. If his periodic inspection shows work out of tolerance, and tool adjustment beyond his time allowance is required, he is empowered to stop the job at once on his own initiative. He "punches off" the job, notifies his supervisor and the setup man, and is thereafter paid his average earnings (based on the previous quarter) until the job is ready to run again or he is assigned another because of excessive delay. He is also paid standard rates for the reject parts as long as they are isolated. If he doesn't stop the job, however, when his periodic inspection indicates work out of tolerance, he is penalized either by loss of premium on work already done or by being required to sort the work at his base rate.

When a job is completed, the foreman signs the production card, and thus certifies the quality. Substandard parts are sent to the gage crib for sorting inspection, on the initiative of either the operator or the foreman.

Work done in error or otherwise substandard, from any department, is sent to a central salvage crib. The two people there sort it into three categories:

1. Parts which are satisfactory
2. Parts which can be reworked
3. Scrap

Parts in class 2 are sent to a department capable of doing the rework, an excess standard is applied, and a form (salvage ticket—see sample) filled out describing the cause. The foreman of the department doing the rework sends the charges to the responsible department, where the foreman has a week in which to file a report with Production Engineering explaining the error and showing what steps have been taken to prevent a recurrence.

Each week, all supervisors receive a scrap and rework charge summary, and Production Engineering and the Chief Final Inspector check through reports and make their decisions. Thus there is strict accountability. This "board" also reviews all scrap and rework before disposition to segregated areas, thus meeting Government requirements.

Does the system work? Well, there is the saving of 30 inspectors and the 50% slash in rework and scrap, the first year—two considerable items. Waiting or down time has been cut as well, and over-all standard cost has been reduced, in spite of increase in time standards because of addition of inspection allowance. Executives feel that the latter is a result of greater interest of operators and foremen because of increased responsibility, and greater cooperation between production, methods and engineering departments. Also, there is definite competition between departments to keep scrap and rework charges down. Lastly, Personnel attributes to the new system a definite rise in operator skill and knowledge, particularly in using gaging equipment, in reading blueprints, and in understanding the Methods Department, Production Engineering, and service groups in general.

THE GRAFLEX STORY

tooling is controlled here, but done outside

TOOLING, tremendously increased because of Ordnance contracts for optical instruments as well as because of introduction of three new cameras, has far out-distanced tool-design capacity at Graflex. As a consequence, 90% of current tooling is being done by outside contractors, 80% to the contractor's own designs. This group of 9 double-sided tool follow-up boards, plus several others, provides visual control. Every tool in process is shown, and the record is posted daily. Colored pins provide quick information on key points. The girl who does the posting has a special pallet made from a clip board, with tool cards clipped at the bottom and pad for pins at the top

TOOL FOLLOW-UP RECORDS are kept on 8½x11-in. forms like this one, as many sheets as necessary being used for tooling on each model or job. Spaces at the top are provided for the model or unit, production quantity (which affects elaborateness of tooling), production due date, and tool-completion date. Then, in order in the columns, are shown the identifying number for the part, a brief description in words of process and tool the machine on which it will be used, the tool number, whether it is new or being altered, source of the design, the order date, the maker, and the date of delivery. Pins are used normally only at far right. Colors indicate these conditions:

Condition	Pin Color
Tools or Gages in Design	Brown
Tools or Gages on Quotation	Red
Tools on Order	Blue*
Gages on Order	Yellow
Tools Received, but not Inspected	Blue & Lt Green
Gages Received, but not Inspected	Yellow & Lt Green
Tools or Gages Inspected	Light Green
Designs Received	Dark Green†

*If in middle of vendor's symbol, it also denotes either change, alteration, or detail on order. Note the number of such situations on the nearest board in the accompanying photograph—a military item.

†Used on left end of the board only.

TOOL-CONTROL CARDS are double-sided, stiff, and 6 x 9 in. They are used both during tool development and afterward as a permanent record of the tool. They show part number, tool number and description, then list parts that can be made on it. Vendor's names, with estimates and actual costs, are shown, then dates ordered, promised, received, and completed, plus inspection data. The reverse side shows alterations and repairs on the tool, giving data like those listed above, plus remarks. It is from these cards that the tool follow-up board is posted

TOOL AND PROCESS LIST

MODEL M-65 UNIT PROD. DATE

PROD. QUAN. TOOL DATE

PART NO. AND TOOL NO.	PROCESS AND TOOL	MACHINE	TOOL NUMBER	NEW OLD	VENDOR OR BY	ORDER DATE	VENDOR	DATE DELIV
C5582532	HOUSING							
	Pattern Equipment		C5582532			2-8	Anstice	5-8
Item #45	Milling Fixture		T1-C5582532		BAR	2-2	Bison	4-3
	Mill Fixture		T2-C5582532		BAR	2-23	Bison	4-27
	Drill Jig		T3-C5582532		BAR	3-17	Monroe	5-3
	Chucking Fixture		T4-C5582532		BAR	3-19	Weidner	6-7
	Profile Fixture		T5-C5582532		BAR	3-2	Arrow	4-12
	Profile Fixture		T6-C5582532		BAR	3-6	Pluta	5-2
	Spec. Key Way Cutter		T7-C5582532		BAR		Cincinnati	
	Milling Fixture		T8-C5582532		BAR	3-12	Liberty	5-8
	Profile Fixture		T9-C5582532		GRAF.	7-6	Oeto	7-31
	Drill Jig		T10-C5582532		GRAF.	7-27	Graflex	7-28
	Step Counterbore		T11-C5582532		GRAF.	9-5	Graflex	9-17
	Step Drill		T12-C5582532		GRAF.	9-15	Graflex	9-17
	Tool Layout		T13-C5582532		GRAF.			
	Spec. Counterbore (3)		T14-C5582532		GRAF.	1/26/52	Graf.	2-13
	Swing Recess Tool		T15-C5582532					
	Cutter Reism		T16-C5582532		GRAF.			
	Shell End Mill		T17-C5582532		GRAF.	11/24/52	Graf.	
	Dial Depth Indicator		G2-C5582532-5		GRAF.	4-9	Pluta	6-2

ALTERATIONS AND REPAIRS

DATE ORDERED	JOB NO. OR P. O. NO.	DATE PROMISED	DATE RECEIVED	INSPECTION DATA	DATE COMPLETED	FIRM	EST. COST	ACCT. COST	REMARKS

Item 45 (M-65) PART NO. C5582532

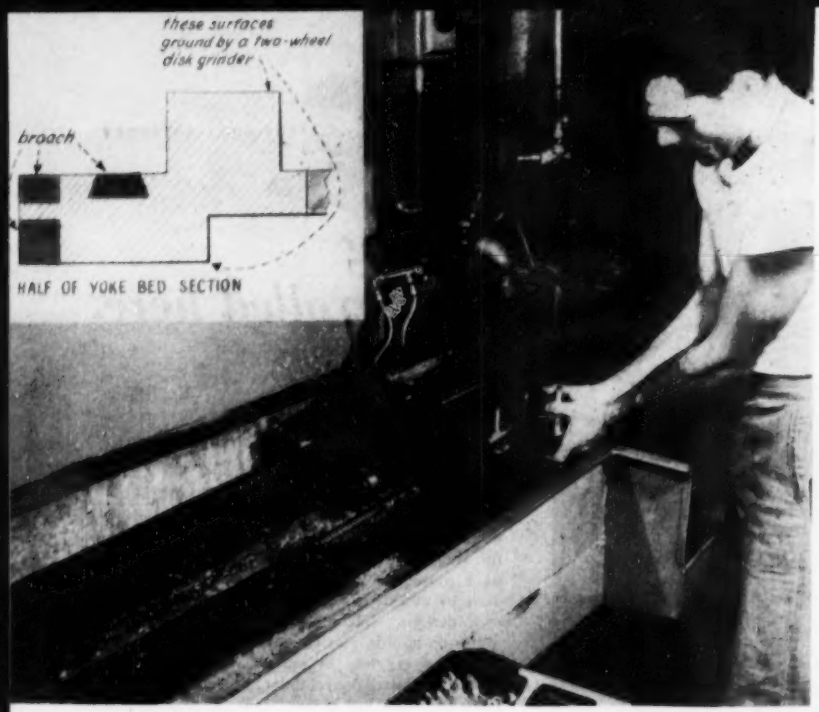
TOOL NAME OR DESCRIPTION PROFILE FIXTURE TOOL NO. T5-C5582532

PART NOS.	JOB NOS.	P. O. NOS.	REMARKS
			M-65 Spare Parts
	14000	57524	(1) as per t/dwg.
	14000		(1) alter - as per t/dwg. Chg.'A'
	14000		(1) alter - as per t/dwg. Chg.'B'

FIRM ARROW TOOL CO., INC.		EST. COST	ACCT. COST $109.00
FIRM GRAFLEX TOOL ROOM		EST. COST 5 hrs.	ACCT. COST
FIRM GRAFLEX TOOL ROOM		EST. COST 6 hrs.	ACCT. COST

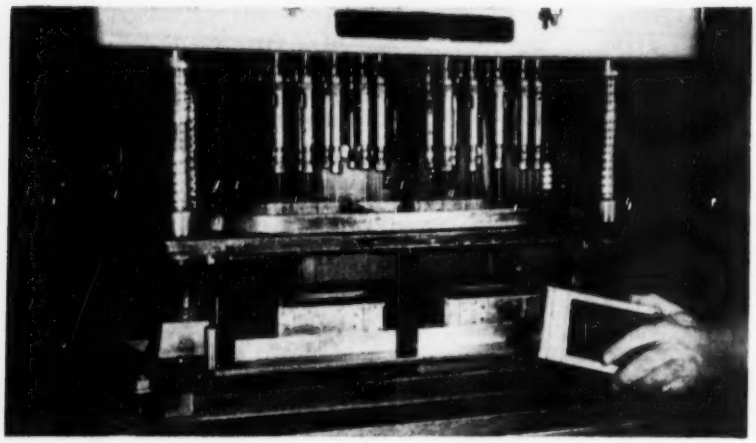
DATE ORDERED	DATE PROMISED	DATE RECEIVED	INSPECTION DATA	DATE COMPLETED
3-2-51	3-20-51	3-21-51	4-12-51	
9-24-51			9-26-51	
11-2-51			11-6-51	

setups are



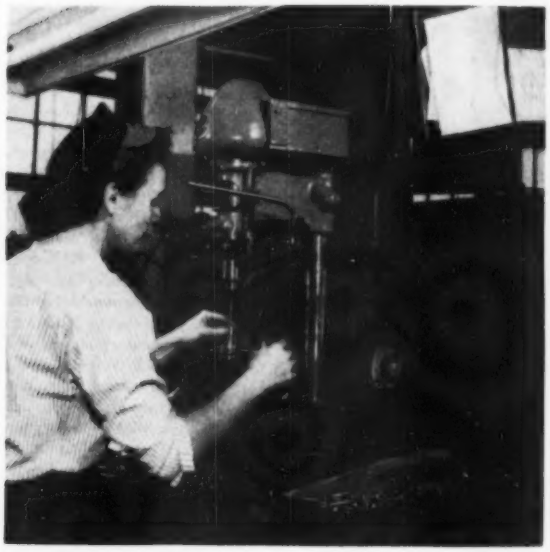
AN "IMPOSSIBLE" JOB, abandoned by two broaching-tool makers in turn, is cutting the dovetail in the yoke bed section. This is an extruded 24ST aluminum section about 4 in. wide and 6 in. long with rails along each edge (see sketch). It is cut to length and sections of web blanked out to reduce weight, then must have a small dovetail and guide rail cut along each edge. Unless the dovetails are constant in cross-section and the rails uniform in all dimensions and parallel, the lens mount will stick or cock as it is adjusted for focus. The job is a logical one for vertical broaching but was eventually tooled by Graflex on two La-Pointe 2L, 48-in.-stroke, horizontal pull broaches. Fourteen surfaces of six areas are broached to dimension in a single pass, the work (foreground in photo) being held by a clamp block actuated by an air cylinder. As on all jobs, the operator has complete inspection equipment, which can be made out on its rack just over his right shoulder

TUMBLE JIGS are used for drilling, reaming and countersinking three pivot holes in a cast-iron tripod-head casting for the Army (bored casting, right foreground; drilled casting, left). This is typical of methods of handling small lots. Guide bushings are set in welded-on tubes on a heavy steel disk. The disk has three feet, located so when any two rest on the drillpress table, the disk is at the desired angle and one bushing is vertical. The third leg rests on a cast-iron block on the table. Castings for drilling are located by the central bore on a rear plug, indexed to position, and clamped. Two long parallels C-clamped to the table of the twin-spindle Leland-Gifford drill in position so the disk is guided by the inner edge of the forward one when two legs are against the inner edge of the rear one. At the left-hand station, a ⅝-in. drill and reamer operate at 600 rpm in turn in a Wahlstrom slip chuck. At the right-hand station, a ⅞-in. drill at 600 rpm handles countersinking

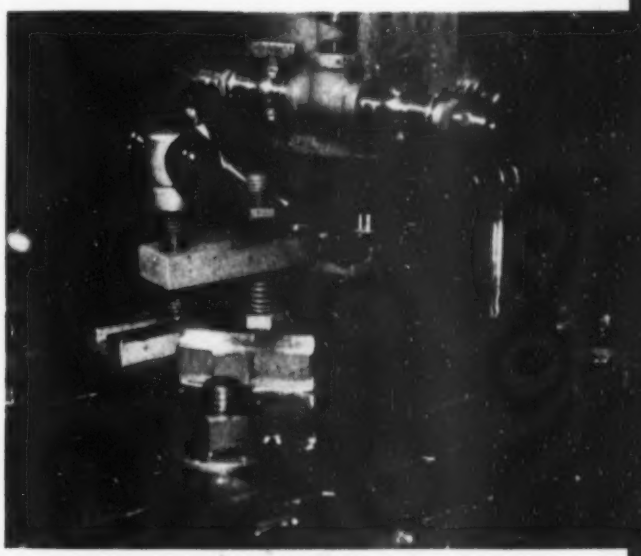


24 HOLES 0.067 in. in diameter are drilled simultaneously in the two halves of a SAE 306 aluminum die-cast plate base for a film-pack adapter. The head comes down to be guided by end pins and to hold the two die castings located by their center cut-outs on blocks. The machine is a Natco with built-in adjustable drilling heads so it can handle other jobs as well. As in most other machining jobs, the operator does his own inspecting and gaging, in this case checking one piece of each 30

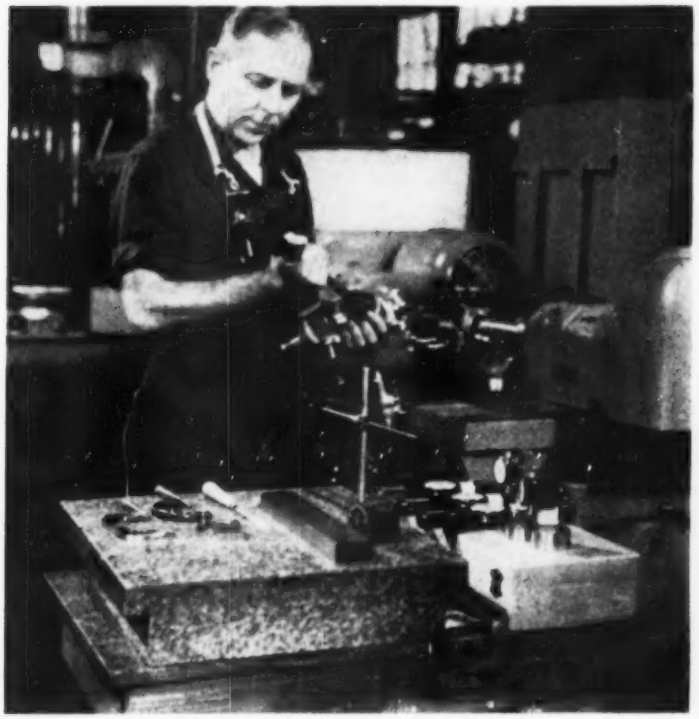
designed for close tolerances and small lots

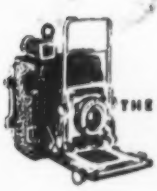


PRODUCTION FIXTURES are used where possible. Here, in reaming a 0.188-in. hole in a brass body for the cord assembly (a cylindrical screw-machine product), the operator loads the collet fixture from above. When she releases the lever, the reamed part drops through into a tote pan beneath the table. The job is done on a Delta sensitive drill reaming at 1500 rpm. Note cellophane jacket on clipboard at upper right, containing job instruction sheet and print. This is at once the work order and complete method instruction, and the only information on the job issued to the shop



SIMPLE FIXTURES like this one handle even close jobs such as milling two arcuate surfaces on a bronze casting (foreground). The segment is held by a screw clamp while two 4-in. cutters guided by the pin at right mill the job in a Pratt & Whitney profiler. The operator mikes one part in each ten and checks with a height gage and gage blocks on an adjacent surface plate

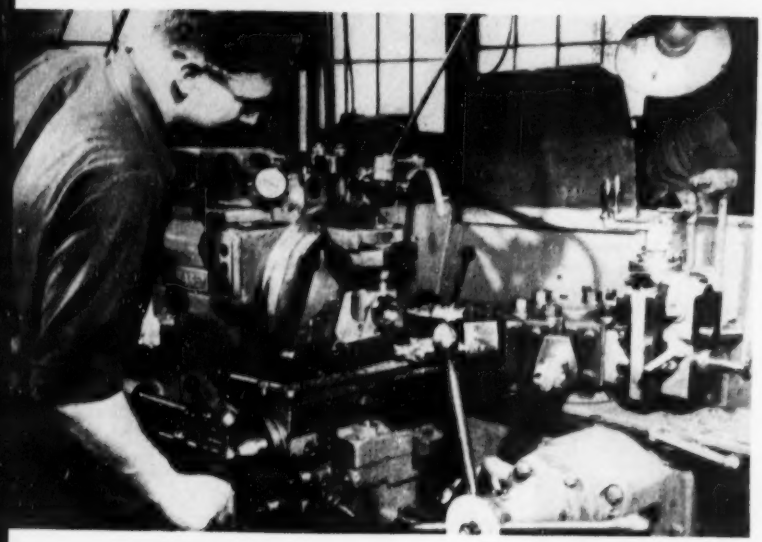


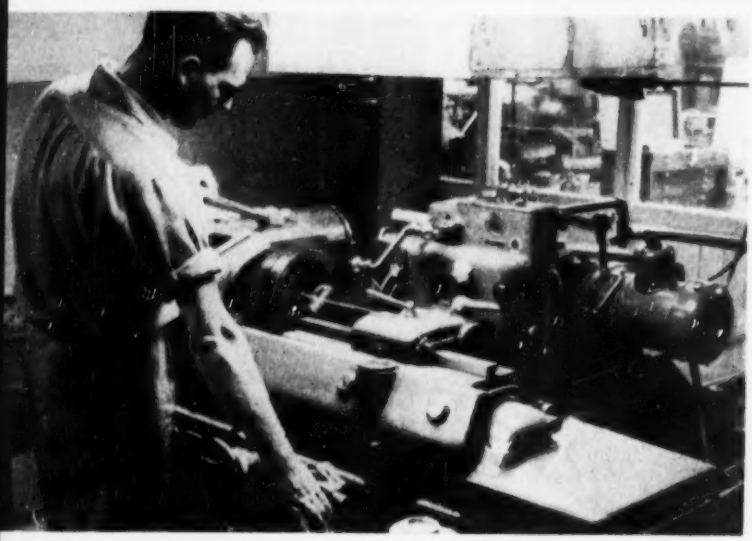


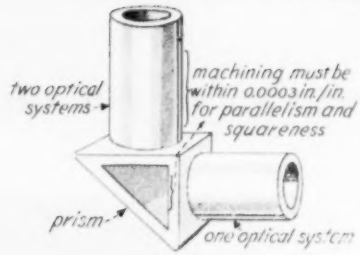
THE GRAFLEX STORY

A CLEARER IDEA of the close correlation between machining and gaging is given by this setup on an ExCell-O 2-spindle boring machine. The job is boring a cast phosphor-bronze housing for the M65 Army telescope, a material difficult to work accurately. Only one spindle is used. It carries a quill with four carbide-tipped bits to produce the stepped bore. In addition to his surface plate, mikes, and feeler gages, the operator has a surface gage with two depth indicators and four plug gages with indicators for the bores. He is allowed −0.001 + 0 on depth, +0.0008 in. on each diameter, and less than 1 minute angularity with the mating bore

Setups are designed for close tolerances and small lots . . .



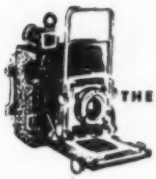




A 20-MIN. CYCLE on a hand screw machine has been cut to 3½ min. machining plus 2½ min. inspecting by setting up one Brown & Sharpe No. 2 G automatic screw machine as a chucking machine on a small die casting of aluminum. The casting is elbow telescope M62, which holds optical elements for the M34 sight used on 75-mm recoilless rifles. It is essentially two small cylinders at right angles joined by a triangular section which will contain a prism (sketch). Tolerances are very close because lenses go in each cylinder and angularity is critical. This operation is machining the longer cylinder inside and out. The casting is held in a block fixture by a screw clamp, and all six stations of the turret, plus the front and back cross-slides, are used. Operations are turn, flat drill, recess, bore, tap, tap, and face with cross-slides. As usual, the operator has his own granite surface plate, plus necessary inspection equipment

SQUARENESS AND PARALLELISM are usually vital in machining because optical systems are involved. This bronze casting, for example, must have faces parallel within 0.0003 in./in. and square with a right-angle bore within 0.0004 in./in. Yet quantities are small. Here the casting, a bronze right-hand telescope housing with a number of curlicues, is chucked in a Warner & Swasey No. 3 turret lathe for finishing the eyepiece hole. The fixture is simply a series of guide bars and clamps on a disk set up on the lathe faceplate. One face of the casting has a flat machined surface, and the operator gages this with the indicator and surface gage on the cross-slide, adding shims until he is within 0.0001 or 0.0002. In the first operation, four tools rough-bore; in the second, four others finish, followed by recessing, facing, two chamfering and one turning tool together, and tapping. (Geometric collapsible tap shown in position.) Cycle time on the operation is 28½ min., 15 min. of it machining, the rest setup and inspection

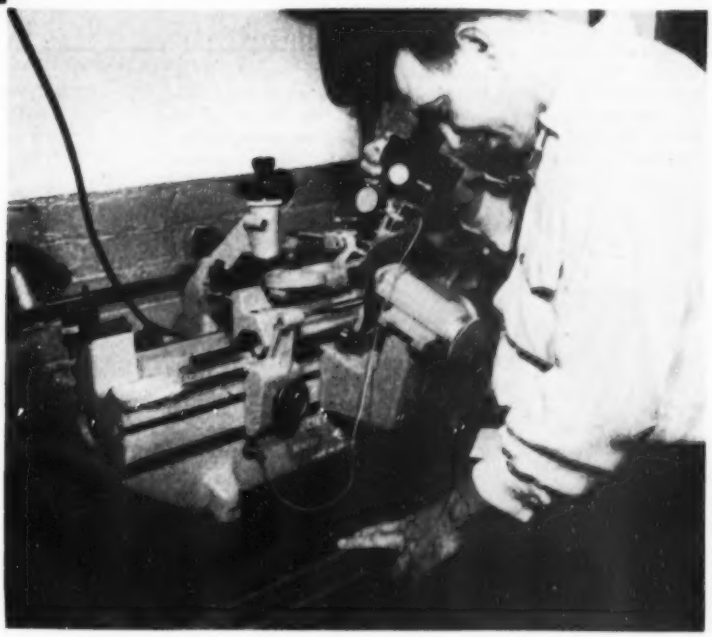
A TOOLROOM MACHINE here finds production application. A Sip thread grinder, set up in an air-conditioned room, finishes parts to avoid assembly lapping. Parts are rough-milled or chased to within 0.015 in., then ground to size, assuring exact lead and thread form, even on such odd jobs as 6-lead screws. Here a double-lead ½-10, V-thread screw of Type 203 stainless for a new Army telescope is being finished. Lead error is held to under 0.0001 in. A special fixture is used, applying small dog clamps for driving the work. It permits accurate location of lead. This grinder, which also finishes thread gages and taps, is the fourth of its type in the country



THE GRAFLEX STORY

ANOTHER PRECISION MACHINE is this ultra-accurate optical jig borer, Sip type MP-2H, with 16-in. longitudinal table travel and 12½ x 27½-in. table. It makes a variety of tools and gages; here is working on a part for an assembly fixture for the "Riteway" film holder. The machine is on a large block of concrete, sand isolated from the building, and in its own air-conditioned room, is accurate to 0.00005 in.

FINISH-MACHINED PARTS are carefully checked in gage cribs before delivery to assembly. Here the carriage for a highly accurate telescope sight—the bronze casting in the foreground—has been set upon parallels on a surface plate. Dimensions from gage pins are being checked with surface gage, dial indicator, and Cadillac Pla-chek (really a super-micrometer)



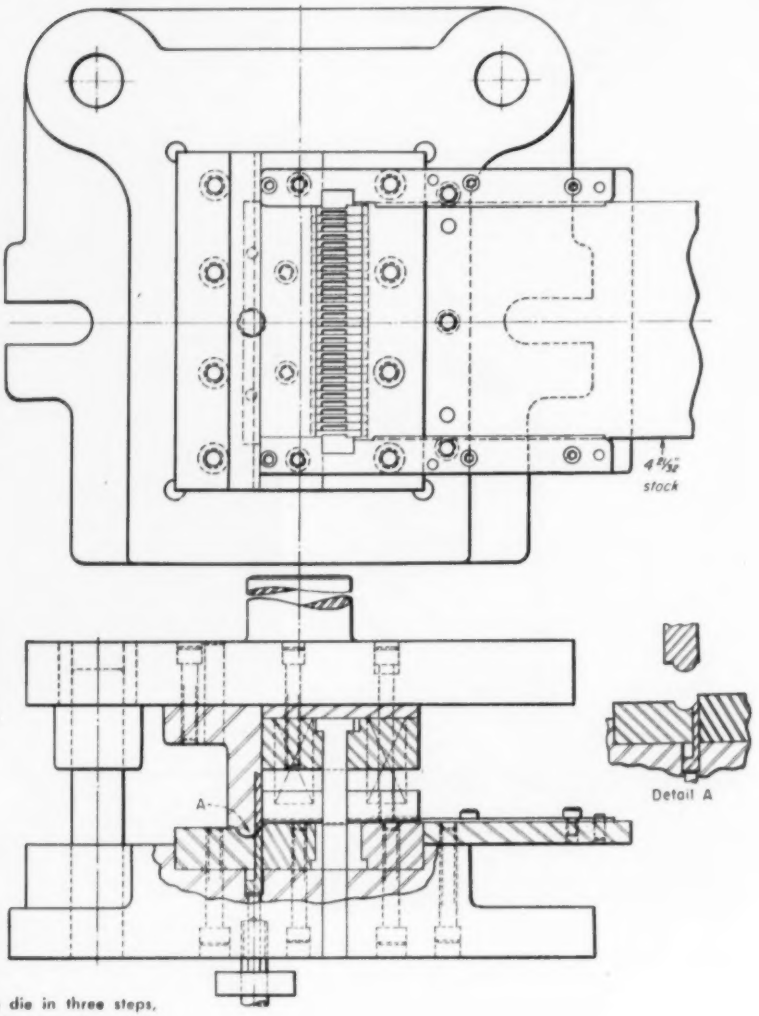
ANOTHER CHECKING TOOL in one gage crib is this optical screw-thread checker. Made by Sip also, it can check internal and external threads for lead, shape, concentricity, and other characteristics, is here checking a 6-lead screw for a military telescope

THE GRAFLEX STORY

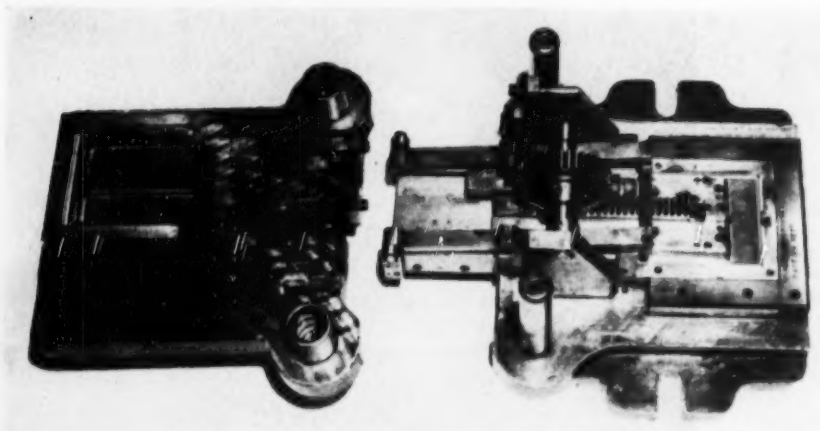
two unusual dies produce

At present, presses are being tooled with progressive dies where runs are sufficiently large, and roll feeds, straighteners, and similar mechanization are being added. Only two dies are shown here, each somewhat unusual.

Another regular procedure is worth noting. When a run is completed the methods man takes the die and the last part. He sets up the die in a press reserved for the purpose and checks all dimensions and functioning. If any work must be done on the die, it is ordered at once, before the tool goes back into the die storage. Thus stored dies are always ready to run. One of the commonest problems is burrs—some dies must be reground after only 500 parts have been run, to keep burring to a minimum.

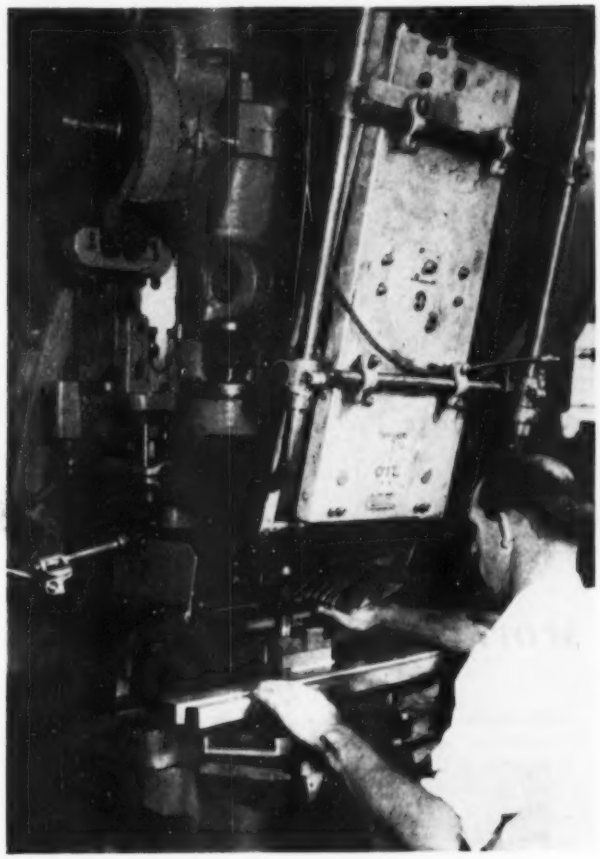


BRASS COMBS (above), which are paired inside a felt envelope to act as a light shield in the film pack, are produced in this progressive die, the only one thus far in use at Graflex. The stock is spring-tempered brass 0.005 x 4 21/32-in. strip. It moves through the die in three steps, the first notching and perforating the strip, the second an idle station, the third cutting off the comb, forming the tooth tips, and shaping the comb teeth to a curve. The die is mounted in a Danly set



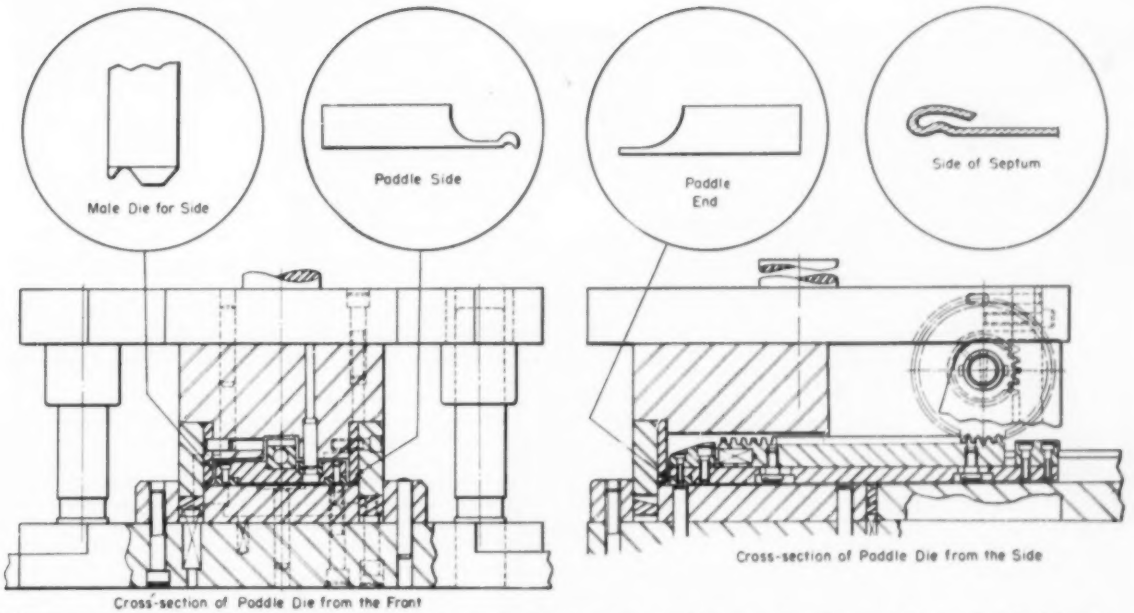
SEPTUM PLATES—flat aluminum sheet 0.013 in. thick, with three edges bent inward (far right)—must be flat and accurately formed. They carry cut film, and have a slight ridge within the curled sides to force the film flat against the center of the septum, which is the optical plane. To achieve this, the descending male die presses down a rack which rotates a pair of gears, and this in turn forces a rack forward which carries a heavy "paddle." This paddle contains the grooves in the bottom, and is heavy enough to prevent buckling of the septum when its edges are formed around it

film-holder parts

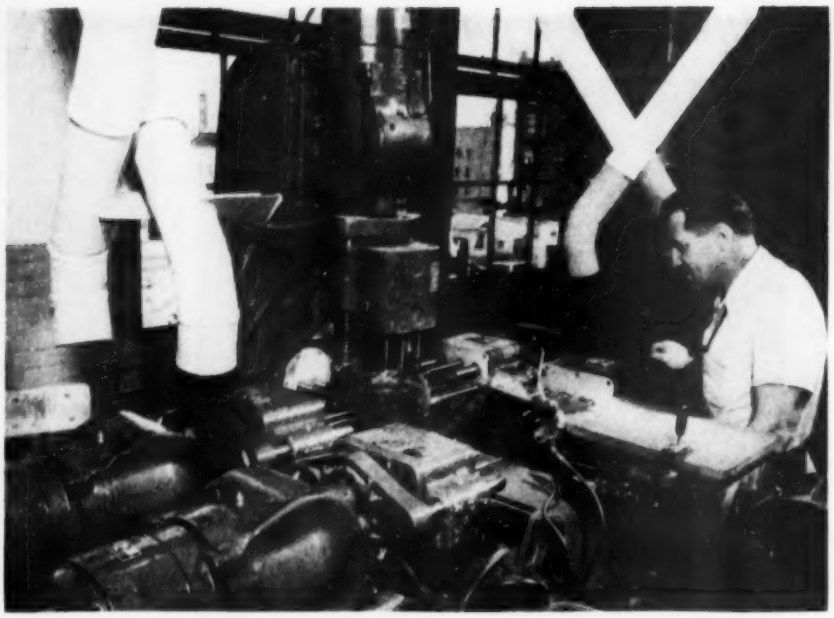


AN UNUSUAL hot metal-bonding job is assembly of two aluminum septums to a center stiffener plate, formerly a spot-welding operation that resulted in roughness and distortion that caused a high percentage of rejection. Now the septums are brushed with 3M cement No. 776, placed on the plate and set in a preheat fixture (between presses) for 7 sec. Then the assembly is placed between masonite dies in a Danly dieset in either of the two Denison 2-ton Multipresses for a 60-sec cycle at 255 to 275 F. Assemblies are then placed in a special plywood totebox (right rear), slotted so they do not touch each other. This is typical of special carrying equipment used throughout the plant

THE COMB DIE is currently mounted in a Bliss No. 21 inclinable press otherwise used for blanking. It is equipped, as are all second-operation presses, with the All-Safe Airgard safety unit, an air-operated, clear-plastic shield moved down by an air cylinder to permit view but not entry of hands. Up to now, most dies have been compound to retain flatness of parts. Progressive dies are being designed, however, to speed up a number of operations where quantities justify


Male Die for Side
Paddle Side
Paddle End
Side of Septum
Cross-section of Paddle Die from the Front
Cross-section of Paddle Die from the Side

DETAILS of the third-operation paddle die. The first die blanks the plate, the second brings up the edges, and this one does final forming



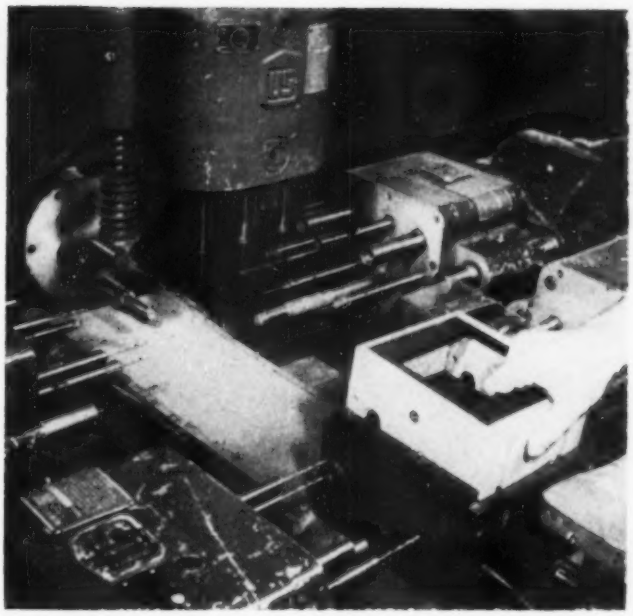
38 HOLES ARE DRILLED in two positions on this Kingsbury way drill with seven US heads. Two holes are drilled and countersunk, and 35 drilled with 0.070- to 5/16-in. drills. The case is set in a box jig (right) with guide bushings and held in position with a top clamp plate. Pins on each head enter base bushings in the jig to assure exact location as the heads move in. When operations at the first position are completed, an air cylinder automatically indexes the jig on cylindrical ways (under dust-cover belt in close-up) to the second position. When these operations are completed, the jig returns to the first position to end the cycle. Heads interchange to suit hole positions on the three models of cases processed on this machine

mahogany is worked to metalworking

MAHOGANY, covered originally with leather, but now with a tougher plastic, forms the case for the three types of "Graphic" cameras, used widely by press and professional photographers (in fact, in taking these pictures and by our editors). While magnesium and aluminum, as well as steel are used for parts and covers, mahogany is believed to be better able to absorb shocks in service. But it must be aged properly and moisture content brought to an exact amount, then processed like metal in many respects, and to similar tolerances, so it can be used in combination with metal. Here are shown typical machines for processing the case, an open-ended, shallow, 4-sided box with brass or aluminum inserts for screw fastenings

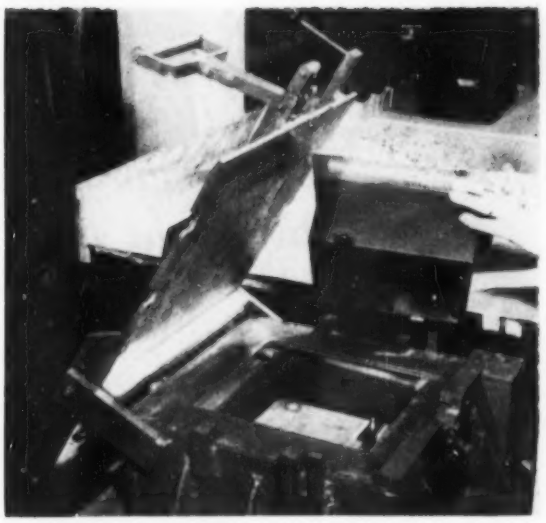
THE GRAFLEX STORY

SLOTS 0.031 in. wide by 5/32 in. deep are cut into the case rim (only 5/16 in. thick) by this special machine. A 7000-rpm Dumore grinder head is mounted on an arm beneath the table and carries the 4-toothed 2-in.-dia HSS cutter. The wooden case is fitted over a steel fixture (under operator's hand), which is then fed across the table along the guide strip. At the center of the strip is a button controlling a solenoid that actuates an air cylinder. When actuated, the cylinder pushes the cutter up into slotting position. A guide pin between blade and strip, fitting into slots on the underside of the jig, limits jig travel. Thus the fixture can be set flat on the table only in certain positions and the saw is up only when it is flat, so work can be cut on each side to exact dimensions—even interrupted on one side to avoid running into a semi-circular slot through the case edge



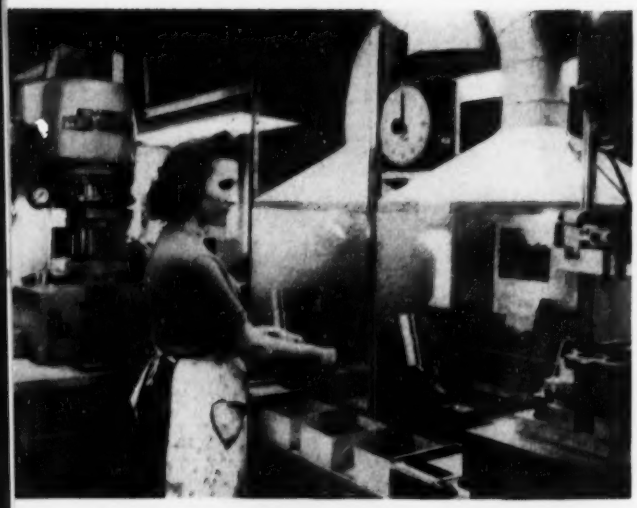
SHUTTER-PLATE COUNTERBORING of one case wall is done in four Robinson pantographic routers, in each case to a steel templet (center rear). A given case usually requires two operations, one to achieve a desired general counterbore, the second to produce deeper clearances at required spots and to put through the shutter slot (shown). The case is set into a box fixture and air-clamped by an outside latch plate. Router bits operate at 14,850 rpm

standards

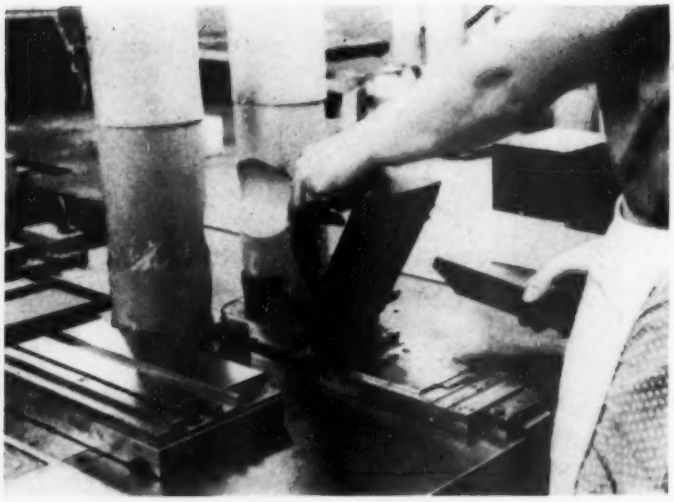


LEATHER (originally) or tough plastic covering for the mahogany case is applied by hand with a special adhesive, then pressed tightly against the wood for the drying cycle in this special fixture welded of structural plate. The case is locked against a cover plate, then set over a central block to provide internal support. When it is firmly seated on the block, a Micro Switch permits the rest of the cycle. Outside the box are flat rubber pads, and outside them in turn, an ordinary automobile inner tube. When the counterweighted top is closed and locked (the plate slides forward to catch under a lip along the front and lugs at each side), the spring pin at top can be pushed into the box at the rear right corner, opening the air valve and inflating the tube for a 17-sec pressure cycle

THE "FRONT DOOR" on a Graphic camera, which carries the slide on which the lens is moved out, is an aluminum plate called the "bed". It is plastic-fabric covered in an automatic-cycle press. The bed, with attachment and braces hinged to it, is placed in the gaging fixture at lower right and any dirt removed. Then toluol is brushed in the center and the blanked fabric placed in position. The toluol softens the inner surface of the plastic so it adheres to the metal. The assembly is then placed in a Harco 1½-ton hydraulic press with a special fixture that grips the bed at each side. The press comes down in a timed cycle of 50 sec, providing pressure plus 225 F heat. This causes the fabric to adhere all around except at the corners of the bevel of the convex center section. A sponge-rubber hollow rectangular pad is placed over the fabric and the press cycle repeated. The operator then checks smoothness and adhesion. Edges are trimmed by hand during cycling of the next bed

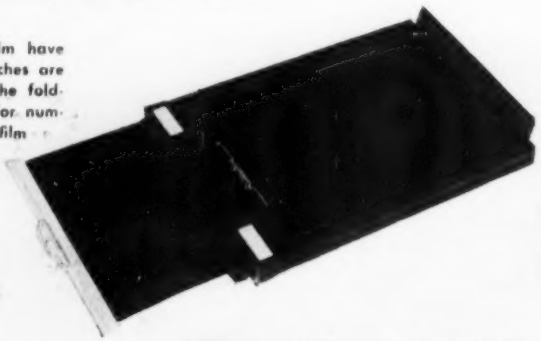


STYRENE COPOLYMER PLASTIC BODIES for the new "Riteway" cut-film holder are molded in two parts. The two sections are clamped with mating edges down, on felt pads saturated with a solvent in one of the exhaust cabinets. During an electrically timed 20-sec cycle, the fluid softens the edges of the plastic. Parts are then inverted on the wood rack just in front (so fumes can still be exhausted) for another cycle, and finally moved to the table just in front of the press for a further drying period. They are mated in the press fixture over an aluminum divider faced with septum plates, a filler block inserted to preserve end opening, and pressed for 1 min. No heat is used in the electrically timed cycle in a 4-ton Denison Multipress. The holder is pressed to correct thickness, with scarf on the edges. The operator handles two presses

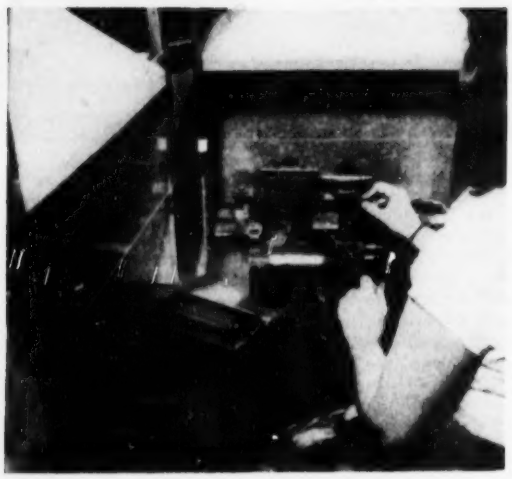


ASSEMBLED HOLDERS or frames have scarf or fin on three edges. This is removed by routing in a twin-spindle router. The pack is placed on a fixture bed, over a 3-part block that fills the opening on one face. Closing the lid of the fixture pulls up the central wedge section to lock the block inside the face opening. Then the fixture is moved forward on guides between the twin grooved routing cutters that trim the side scarf and insert light-stop grooves at the same time. (Note elaborate shielding and exhaust for cutters). Ends of frames are trimmed to length by placing on a sliding fixture at left, using the ungrooved portion of one router cutter by rotating the shield to expose it on the other side

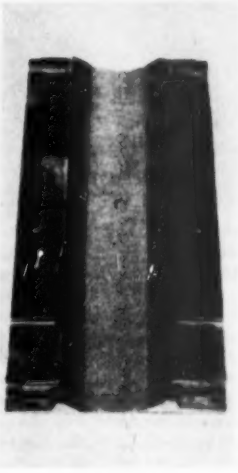
"RITEWAY" HOLDERS for cut film have all-plastic bodies. The white patches are provided for identification and the fold-out bottom element is recessed for number tabs to be exposed on the film



"riteway" film holders are assembled the right way



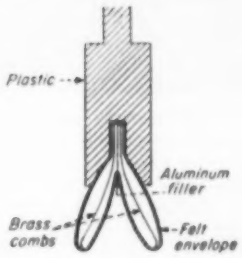
AT THE BASE of the holder there is a fabric hinge with two plastic flaps (see at right), into which film-number tabs are inserted and which the slides enter. To make this assembly, tape is fed from a roll (center) into a double fixture in an exhaust booth. At the first station, tape edges are soaked by felt pads saturated with a solvent on an overhead hinged plate. Then the tape is advanced to the second position, flaps placed in position, and the cover placed over and latched. Latching operates a Micro Switch that in turn pressurizes an air cylinder to apply pressure for 1 min. This actually forces softened pastic into the fabric of the tape. The assembly is then trimmed from the tape. The operator, seated at a kidney-shaped bench, operates two setups simultaneously, each under its own hood



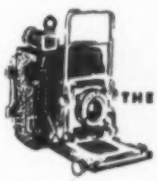
FINISHED HINGE ASSEMBLIES are applied in the same way to the base of the holder. The base is wet on a felt pad for 20 sec (electric timer), the hinge fabric set in place, and the assembly placed under the quick-acting clamps for 1-min. drying cycle. In the right foreground is a fixture for checking tolerance (0.003 in.) simultaneously at five points on the setup plate. This is vital, because this plate determines focal plane or registration depth when the film is inserted. Unevenness here would cause some areas of the picture to be out of focus

ANOTHER DESIGN OF CUT-FILM HOLDER, the "Grafmatic", has six septum plates in a drawer within, and is actually an automatic magazine. Drawing the slide exposes the first film, returning the slide and drawing the drawer drops that plate to the bottom, thus preparing No. 2 for exposure. When No. 6 has been exposed, the slide is locked in until the drawer is removed. An indicator dial at the top of the holder shows how many films have been exposed, at any time, and another device numbers each negative as it is exposed. The mechanism is a complex assembly of some 35 die-cast, stamped, and plastic parts, all put together, sealed, lubricated, and inspected by one operator in a 10.79-min. cycle because production is small. This necessitates the unusually large number of stockbins at one work position. One part, a latch lever, requires greasing before assembly, so the operator places a group in a row so one pass of the grease brush lubricates many. She also magnetizes small magnets on the large permanent magnet in the box at

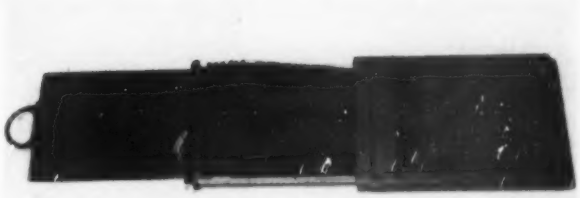
TO PREVENT LIGHT from entering around the slots for the slides at the top of the holder, an elaborate closure is used. It consists of a plastic separator that tops the divider plate and has two "wings," each a fold of felt with two brass combs inside to expand it (sketch). The operator places the separator assembly against a guide knife-edge in the fixture above left, then pushes it down against a small felt wick. This starts an electric timer that signals a 5-sec cycle of wetting the separator end with a solvent from the small can. The other end is similarly wet, then the assembly is placed in the fixture at right. It is pushed between metal leaves, which move outward when the lever is pulled to compress the light stops so the frame (operator's left hand) can be pushed over it into place. The softened plastic immediately seals to the frame, so the assembly can be withdrawn and set upright in a box at right foreground for drying



Cross-Section of Separator



THE GRAFLEX STORY



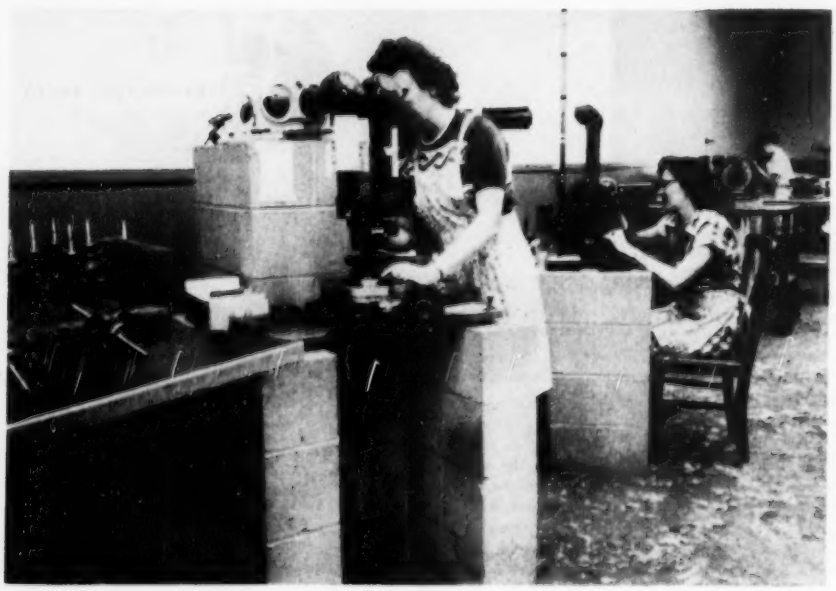
right. The closed jar is glyptol for sealing screws, the black jar neolube, a lubricant for parts, the closed jar at right another lubricant. Actually the assembly is made in two cycles, to allow drying time for glyptol on some parts. This is the second cycle, completed first-cycle assemblies of the 4 x 5-in. holder being stacked at left

FLASH-GUN BATTERY CASES are given a complete final inspection for appearance, continuity of electrical circuits, and mechanical operation of clip-on brackets and bulb insertion, then assembled with cap, testlite (a small bulb for checking batteries in use—in tray under inspector's elbow), instruction booklet, and tab, in a carton. Inspectors may do some assembly work, but are not on incentive pay

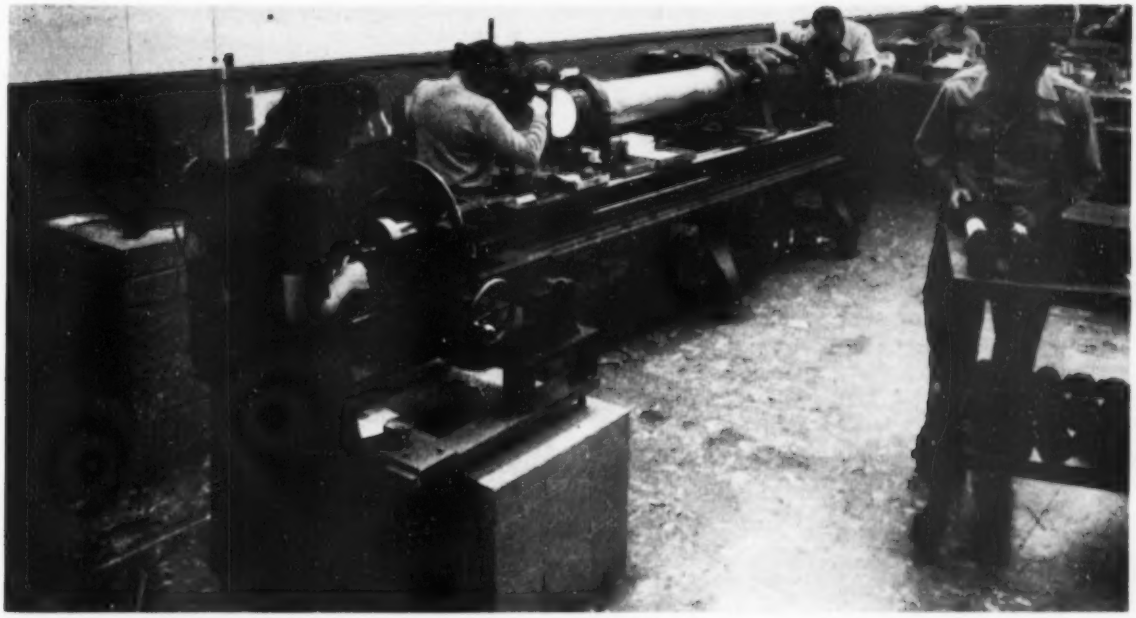
ACCESSORIES such as range finders, backs, focussing elements, stops and the lens are not put on a finished Graphic until just before shipment, because each camera has different accessories to customer's order. Specially trained men inspect the camera and apply accessories. Here infinity stops are located, lens scales calibrated and range finder synchronized with the lens by using a collimator box. The box has a light source at the far end, emitting parallel rays of light. Between the light and the operator are various reticles which can be reflected into focus by shifting the lever at right. Thus the operator can attain scales for 5 ft, 15 ft, and infinity

THE GRAFLEX STORY

final inspection also requires specialized equipment



SEVERAL UNFAMILIAR DEVICES are used in checking military telescopes. Here collimators are being used to check the M48 telescope mount (left and near) and the M65 battery-commander's telescope (second position). Masonry pillars provide stability. Moore jig-borer tables, costing about $600 each, are used both horizontally and vertically (rear) to replace regular elevation and azimuth checkers, which cost $3000 each, in many locations. Note sighting bar and plumb line against wall. Inspectors here are furnished glasses if necessary to correct all elements of vision, and 60 footcandles of light are provided on the working plane



MORE FAMILIAR OPTICAL CHECKING devices are also used. Here in the foreground is an elevation checker, at left an azimuth checker, while at rear is a vertical collimator for selection and pairing of optical systems and a horizontal collimator for testing completed telescopes and sights, as well as for optical and mechanical aligning. The collimators are mounted on the bed of an obsolete lathe—a bed which was old when the company was founded

REGISTRATION of military telescopes can also be checked under actual conditions against a target on another building half a mile away. This is done in a penthouse specially built on the roof of the 1-story St James plant. The room has slide windows on three sides, a glassed door on the fourth, contains an elevation checker with special fixture and mounts for BC 'scopes and sight tubes

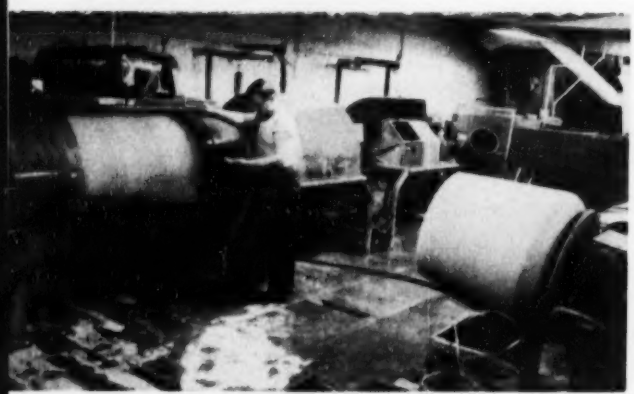
COLD TESTS are required for all Government equipment. Graflex designed and built this cold box for $1200, instead of the usual several times that amount. It uses solid CO_2. A Taylor recording temperature controller operates an electric fan that blows over the CO_2 to control subliming rate. The box will hold any desired temperature down to −80 F within one degree

THE GRAFLEX STORY

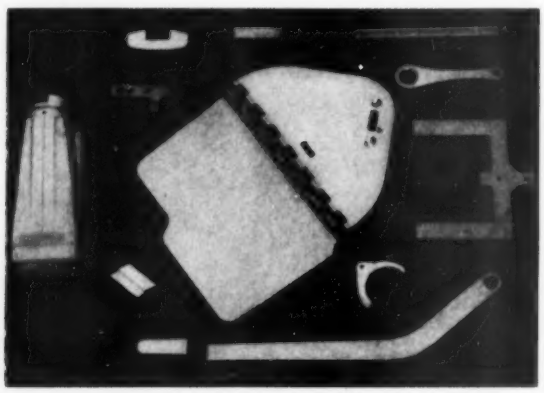
some unusual setups on metal parts

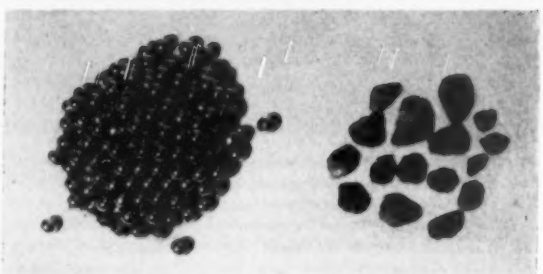
ALUMINUM, bronze, magnesium, and phosphor-bronze castings for Government instruments such as telescopes and finders must be styrene-impregnated to prevent moisture penetration between lenses. Castings are placed in baskets and put in this pressure chamber. Styrene, held at 64 F in the storage tank at right to prevent solidification, is pumped in. The chamber is evacuated for 20 min., then under pressure 20 min. Castings are removed, washed in an Oakite aviation cleaner bath (center rear) to remove excess styrene, sprayed with cold water to remove residue from threads and pockets, dipped into hot water (left) for final washing, and finally put into an oven for 2 hr at 280 F and 4 hr at 300 F to set the styrene in the casting

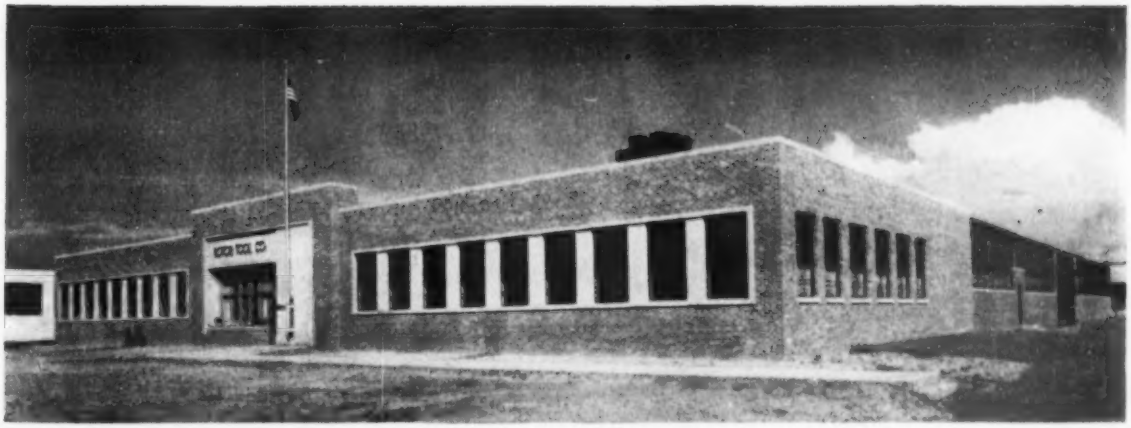
SOME TIME AGO, a rubber gasket had to be thinned to exact dimension. This was done on a Hammond vertical belt grinder. To remove smoke, the grinder was built into an old paint-spray booth. The same setup has since been adapted for finishing aluminum tubes of flashlight battery cases. Cases were previously centerless ground, but this did not provide desired finish. Now, with a rubber follower roll (powered by the motor under operator's left hand) and rubber backing roll behind the abrasive belt, cases are fed through the unit as a centerless belt grinder. Desired brush finish is attained, tolerances are held within 0.002 in., and the mist resulting from the oil coolant required is exhausted from the room with no difficulty



DEBURRING of aluminum, magnesium-alloy, and similar soft-metal parts is done by tumbling with No. 3 Honite plain stones at slow speed. Thin aluminum plates for light shields, for example, require a 2-hr cycle at low speed in the Supersheen machine at left. Extruded-brass release pulls are similarly cycled to remove cutting burrs, then placed in the barrels with small steel balls to burnish to a polished finish in 1 hr. Typical parts are shown in the photo at upper right; balls and stones are shown about half-size at right







FULLY AIR-CONDITIONED PLANT of the Rotor Tool Co, Cleveland, has a conditioning system containing many features designed to give top operating economy. Accurate figures compiled by Rotor show costs to be considerably lower than the gain resulting from increased efficiency, general shop cleanliness, and greater precision in manufacture. Plant contains 40,000 sq ft of floor space

Does it pay to air condition your plant?

Only 3¼¢ per hour per man is the cost for air conditioning at Rotor Tool's new Cleveland plant. Here's the full story on how Rotor obtained low-cost conditioning. Details are given on system planning and cost-reducing features, together with a complete cost analysis, and an appraisal of results

BY H P BAILEY, President, The Rotor Tool Company, Cleveland

Modern plants usually contain many features designed to improve operating efficiency. Yet they often fail to have an abundant supply of clean air of controlled temperature and humidity. This lack makes rigid cleanliness impossible and cuts efficiency more than top executives realize.

A trip through the plant when the outside temperature is 90 F and humidity is high might well show a surprising drop in production because of worker fatigue and listlessness. (In Cleveland last year we had thirty days above 90 F.) Meanwhile, production costs are running along at, say, $1.75 per hour for labor, plus fringe benefits of perhaps $0.25, and on top of this, factory overhead of another $2.00 —a total of $4.00 an hour.

The only answer, however, to the question, "Does it pay to air condition your plant?", requires a comparison of two sets of facts: first, the cost of installing and operating an air-conditioning system, and, second, the results of air conditioning from a production point of view. In our new plant, we have the necessary figures to make this comparison. To give the results meaning, however, let me first tell you what type of system we have and how it operates.

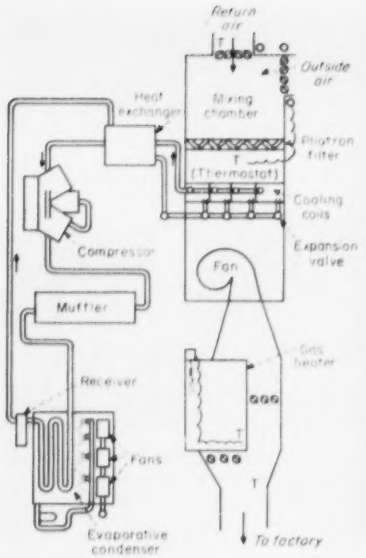
Defining the Objective

Our new plant is small—40,000 sq ft. Of this, 32,000 sq ft is manufacturing area and 8,000 is office space. Our first problem was to define what was necessary to provide a clean factory with controlled temperature and humidity. Inspection of various plants convinced us that few plants were really clean and that some had what they called air conditioning but which actually was only partial conditioning or ventilating. Our analysis showed clearly that few people understood the necessity for controlling both temperature and humidity to obtain true air conditioning results.

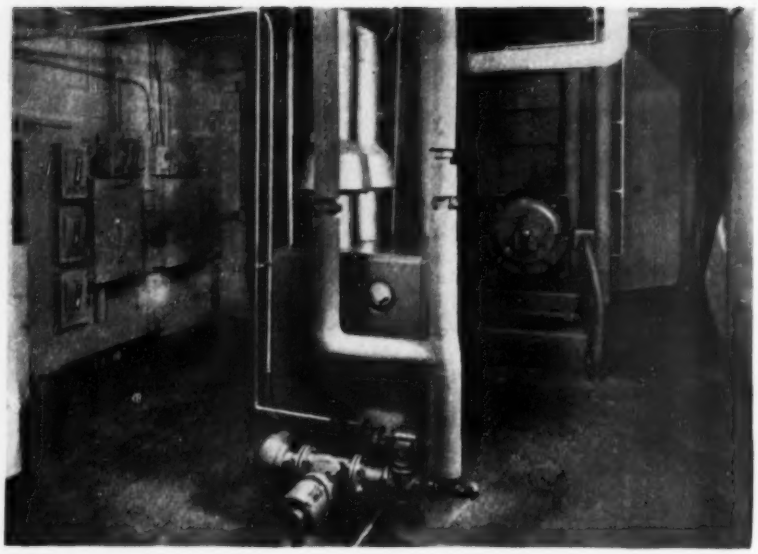
It appeared to us that the cost of these partial systems was not far below true air conditioning and that when the outside air was above 80 F, straight ventilation was unsatisfactory. We came to the conclusion that a thorough job of air conditioning cost relatively little more than a poor job and that, technically speaking, we needed to maintain 80 F dry-bulb, 50% relative humidity inside, when the outside air was 95 F dry-bulb, 75 F wet-bulb.

After the system was operating, we varied temperature and humidity and found that both men and women do not want too low a temperature in the summer months —May, June, July, August and September. About 77 F is fine if relative humidity is 50% or less.

As the heating and air-condi-



AIR-CONDITIONING SYSTEM takes return air from plant and fresh air from outside, mixes both, and passes air through filters and cooling coils. In summer, air then is moved directly to ducts for delivery to shop. In winter, thermostat directs part of air through gas-fired furnace, then into shop ducts. Cooling medium is Freon 12. After it leaves cooling coils, Freon is compressed to 125 psi, then is cooled to 105 F in the condenser. Cooling changes the gas to liquid. This in turn is expanded in the cooling coils, where pressure drops to 40 psi and the liquid becomes a gas. This change absorbs heat cooling the air passing over the coils. Cycle then repeats



PLANT AIR-CONDITIONING ROOM is 20x30 ft. Air flows from left to right, passing through filters and coils in sheet-metal enclosure at rear of room. Fan is in reduced section at right and small portion of furnace also is visible. No noise is heard outside room. Room is attractively painted in light fawn, Swedish red, aluminum, and light blue

tioning system might well be engineered to work together, thus reducing the cost of installation and operation, our planning for air conditioning called for a review of the heating plans. This revealed that in a plant the size of ours it is feasible to locate a central warm-air heating unit in one room and distribute air to the manufacturing areas through ducts. While the initial cost of this system was about $0.17 per sq ft more than unit heaters, we figured that lower annual charges for central heating would more than offset the additional cost of installation.

A further study showed that considerable savings could be made in both the heating and air-conditioning installation by adding 1 in. of Celotex below the 2½ in. Gypsum roof. We also found that fresh air could be mixed with recirculated air easily throughout the factory in the heating season —an advantage which we rated highly because of our experience in our former location where no fresh air could be introduced. For the office, a small hot-water heater with radiators around the three outside walls was specified.

Selecting the Supplier

To be sure of a thorough job that fulfilled our objectives, we wanted to center the responsibility for engineering and installing the system in one company. At the same time, there appeared to be some advantage in having the heating part of the job installed by the same company. So we arranged with our builder to have the job done by the Avery Engineering Co. The builder paid for the heating, which is part of the building, and we paid for the air conditioning. This arrangement worked very satisfactorily and centralized responsibility without additional cost.

Computing the Load

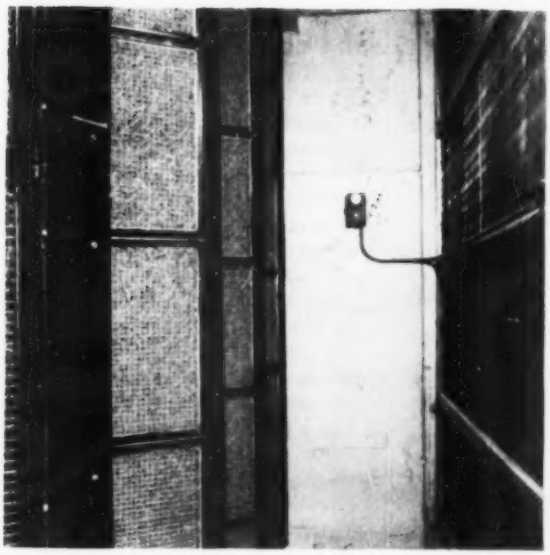
The "basic load" for summer cooling and dehumidifying was figured on the basis of the internal load of lights, power driven machinery, and people: 73,500 watts and 125 people. It was decided to supply the shop with 50,000 cfm of conditioned air at 61½ F.

The "variable cooling load" was figured on the basis of conduction through the roof and outside walls, particularly the glass windows. This "variable load" had been reduced somewhat by "Kool-Shade" screens which are similar to a fine venetian blind.

At this point, considerable discussion developed as to how much window area the plant should have. Much to our surprise, we discovered it was more expensive to have plain walls in Cleveland than window areas. However, we did reduce the window area to reduce the "variable cooling load."

If we were doing it over, we would reduce the window load still further but never below areas sufficient to give a satisfactory feeling of looking out.

As finally determined the load in the shop was 115 tons. In the office, the "basic load" was much less per square foot because the only heat-producing elements were the electric typewriters, billing machines, fluorescent lights and in one case, heat generated by a white printer. The office load was figured at 13 tons.



AIR FILTERS act on dirt particles electrostatically, thus picking up the finest dust and soot. Filters have a large area and are washable. Electric eye on wall shuts off system in case of fire. Air flows through filters to cooling coils on right

COOLING COILS contain Freon 12 which changes from liquid to gaseous state after passing through expansion valve in unit. Pressure drops from 125 to 40 psi. Change to gaseous state requires heat, which is taken from air passing through coils. Fan, rated at 50,000 cfm, pulls air through coils and delivers it to shop heater

For the office, it was decided to install a 5- and 7½-hp. package air-conditioning units with two sets of ducts and two thermostats, one for the east and one for the west end. This was done so the office was not dependent upon the factory and to eliminate any possible transfer of noise from factory to office. Heat coils in the package units permit introduction of about 500 cfm of fresh air without chilling the office. The two units take care of a load involving 15,000 watts in lights, 40 people, and using 800 cfm.

Economizing Features

With reductions in operating costs as our objective, we made a thorough study of the economizing features that are available for air conditioning installations. A comparison of the cost reductions possible in relation to the cost involved showed that these features were very much worthwhile. Details on the operation of these devices in our system are given in a box on the next page.

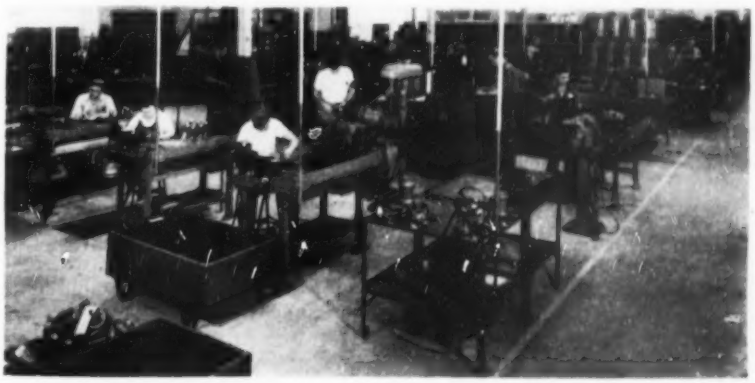
Cost of Installation

The total cost of air conditioning in the office is $7450, which figures $0.93 per sq ft. Cost for the shop (including electrical work) is $40,724, which figures $1.27 per sq ft. Large items in these costs are the packaged air-conditioning units for the office, the compressor and motor, the condenser, sheetmetal work, coils, valves, and installation.

The total cost for air conditioning the entire plant is $48,174, or $1.20 per sq ft. As the cost of building and land, including plenty of parking space, figures $7.64 per ft, the $1.20 represents a 15% additional cost.

Cost of Operation

The first step in figuring the operating cost is to find the annual depreciation. Based on a 15-yr write-off, this is $3211 per year. Maintenance charges were figured at $1375 per year. This allows for periodic cleaning of the condenser as well as for substantial replace-



CLEANLINESS OF MANUFACTURING AREA is considered by Rotor to be a major advantage of air conditioning. Damage from moisture and rust is eliminated. Equally important is that parts can be machined to close tolerances (0.0003 in. on many jobs) consistently day after day. Tool re setting is greatly reduced. Third major advantage is higher efficiency in hot weather

HOW ROTOR HOLDS DOWN AIR-CONDITIONING COSTS

- **A feather valve control on the compressor:** Under light loads the compressor runs at 1/3, 2/3, etc, power. We have found that during the five summer months, this control is in use approximately two-thirds of the time. Power costs are reduced substantially.
- **An economizing control on the outside air supply:** Dampers controlling ducts for outside and recirculated air are interlocked so all cooling is done with outside air when its temperature is below 65 F. Varying quantities are brought in and mixed with the 77 F recirculated air from the shop. The quantity is controlled automatically to give a predetermined mixed-air temperature. Tied in with this damper arrangement is an exhaust system capable of removing 30,000 cfm whenever the system goes 100% on outside air.
- **A maximum temperature thermostat:** When the outside air is above 65 F, the dampers go into the normal recirculating position so the refrigeration machine takes care of the cooling and humidifying requirements.
- **Combined smoke removal and exhaust system:** The exhaust system mentioned above removes excess smoke from machining operations, particularly those on magnesium. Photoelectric cells over the machines start the fans if smoke reaches a given concentration. An interlock opens outside-air dampers and closes recirculating-air dampers so there is quick exhausting close to the source. For protection against fire, thermostats in the outside, recirculated, and delivery ducts stop the fan and close the dampers if temperature becomes excessive at any time.
- **Variable bypass heating control:** When the system is used for winter heating, from 50 to 90% of the air bypasses the warm-air heater. Control is by automatic dampers held in position by a thermostat that maintains a fixed shop temperature. With the bypass method, supply air temperature ranges from 75 to 100 F depending upon the heating needs of the plant. Even though the heater may operate intermittently, there are no hot and cold blasts such as are experienced with a simple on and off system.
- **Evaporative condenser:** This uses only 5% of the condensing water normally required by a standard water-cooled condenser. Although water charges are reasonable in Cleveland, the cost of the condenser is saved in three to four years.
- **Heat exchanger:** This permits the refrigeration machine to work at maximum efficiency under varying load conditions, thus reducing power costs.

ments during its life. Attention also was given to relatively small items such as replacement of filters, charges for outside inspection and similar service needs.

Determining Power Charges

Power charges were figured by putting a separate set of meters on the motors in the air-conditioning room. As the system was not started until June, power for May and part of June was estimated on the basis of current used day by day compared to day-by-day temperatures. Total power cost, therefore, including demand charges, was $1181 for the five months. This brought the total cost of air conditioning per year to $5767.

This cost, divided by the actual hours for the period, gave an average cost of 3¼¢ per hour, per employee, for the five summer months. There would, of course, have been some cost for straight ventilation which is not considered in the above figure. As the system has extra capacity for future expansion and the added cost of this extra air conditioning is limited to the power cost and some additional maintenance, the 3¼¢ undoubtedly is conservative. We feel that the over-all figure ultimately will be down to at least 3¢ per hour.

Three major advantages appear from complete plant air conditioning. The first is cleanliness all the year around. Our products are highly finished metal parts usually small in size with close limits. In the past we have been handicapped by moisture and rust between operations. These difficulties now are eliminated.

The second major advantage is temperature control during machining. In the old plant we had considerable trouble with temperature variations, as tolerances are as low as 0.0003 in. on some operations. This was particularly noticeable on magnesium which we use to obtain lighter weight in our products—portable power tools. Tool re-setting now is greatly reduced. We are inclined to rate this advantage of air conditioning perhaps equal to the advantage of cleanliness.

Efficiency Is Higher

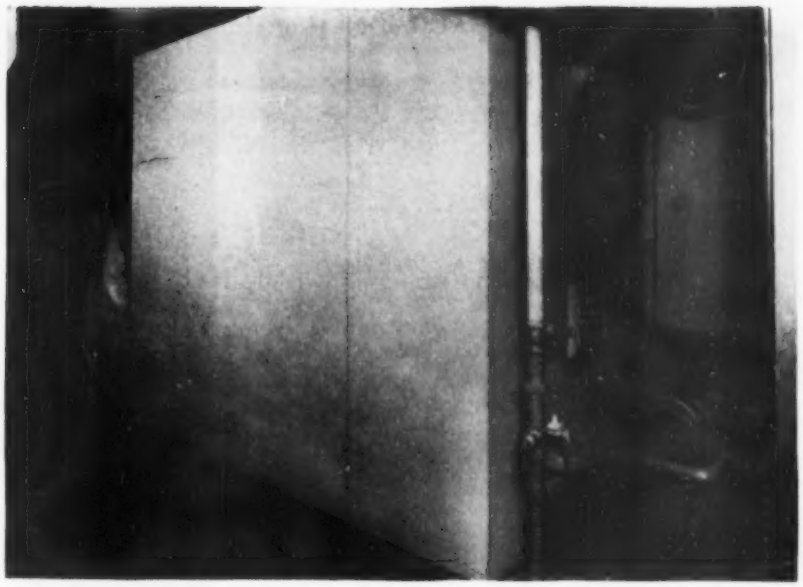
The third major advantage, of course, is the elimination of the lag in efficiency in hot weather which we found to be quite noticeable in our former location. Uniform temperature of 77F with 50% relative humidity keeps the shop working on days when other plants in the vicinity have closed because of extreme conditions. Under average conditions, it maintains a steady shop efficiency.

It is perhaps too early to get conclusive figures but after moving to the new location we found, at first, a slight increase, and then a better increase in actual weekly efficiency figures. The improvement probably is greater in the younger men but it is evident in spite of the fact that we have added new personnel. We feel safe in concluding that because of air conditioning in the five summer months, we have realized an increase in efficiency of 3 to 5% as a steady factor.

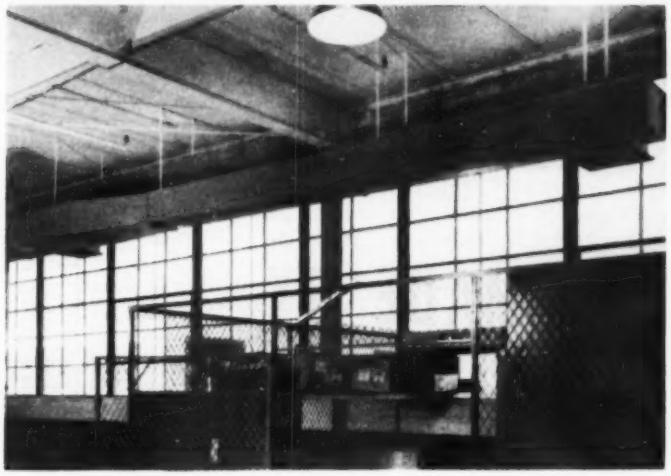
Does Air Conditioning Pay?

The cost of air conditioning is 3¼¢, or less than 1% of the cost of labor and overhead in the plant. These factory costs run $4 per hour, so it is quite evident that our air conditioning has proved to be a good buy.

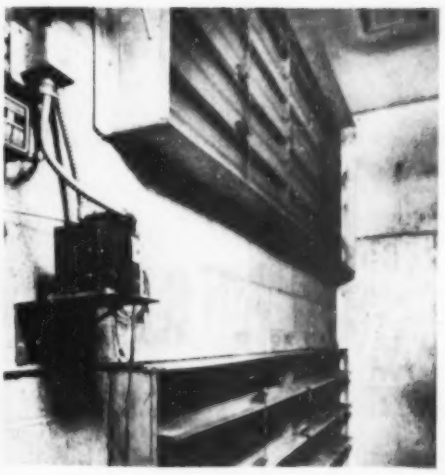
During a series of open houses when we invited other factory workers to visit us, many of the



GAS-FIRED HEATER is controlled by thermostats to maintain fixed temperature in air delivered to shop. Depending upon heat needs in plant, from 50 to 90% of air from fan at far left bypasses heater. Control is by automatic dampers in two ducts at far end of heater. Variable bypass saves on heating costs, avoids hot and cold blasts



SHOP DISTRIBUTION DUCTS run nearly the length of the plant. One main duct is located just west of the plant centerline, the other (shown) is on the east side to cover the window area in the machining section. Step-down from 42x24 in. to 16x17 in. is visible

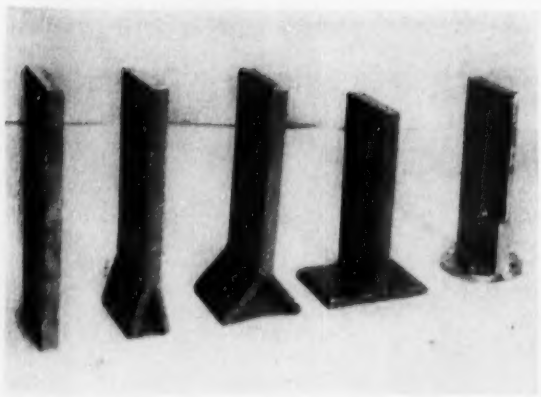


INTERLOCKED DAMPERS add to over-all operating economy of Rotor's air-conditioning system. Economizing control, left, operates upper damper to bring in outside air to perform all cooling when outside air is below 65 F. Intake for air from plant is at bottom. Tied in with damper arrangement is system to exhaust 30,000 cfm when air-supply system is 100% on outside air

men and their wives were quite emphatic in their comments that the days of a plant which provided intolerable conditions in the summer were definitely over. We feel certain that it would have been foolish for us to have built a plant as a permanent home which might have become obsolete, or require expensive changes, in a few years because of lack of air conditioning. Definitely, we have experienced greater ability to recruit high-grade employees who are anxious to come to work in an air-conditioned plant.

As a result of our experience, we wonder why metalworking plants in general do not install air conditioning. The cost of the installation might be higher in plants that are divided into two or three sections, but this in turn could be largely offset by the installation of two or three air-conditioning units.

Today's metalworking costs are high, taxes are high, and we consider it obvious that plant air conditioning is as much a part of an efficient plant program as adequate lighting, pleasant working conditions, and efficient equipment. While the basic efficiency of air-conditioning equipment has been high for years, the various features described above make the modern system considerably more efficient and less costly to operate than earlier installations. We would not be without an air-conditioning system.



STARTING WITH A SOLID BLANK, flanged contacts are made by first splitting the stock to a predetermined depth, flattening out split section, then trimming and piercing. Finished part at right is plated

FLANGES FOR COPPER CONTACTS are started in solid stock by splitting blanks in a press

FLANGED PARTS MADE BY SPLITTING FLAT STOCK

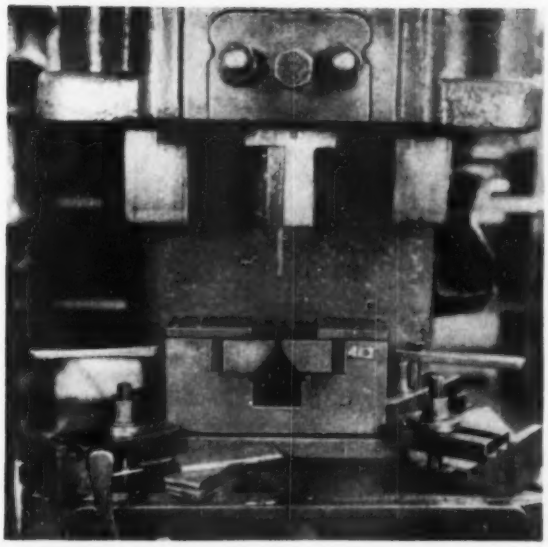
Flanges are formed in copper parts for electrical equipment by splitting flat stock in a press over a knife-shaped tool. The process was developed by a Dutch firm to simplify and speed production

BY M HUISMAN, MANAGER, BROOKLYN WORKS, HAZEMEYER—HENGELO—HOLLAND

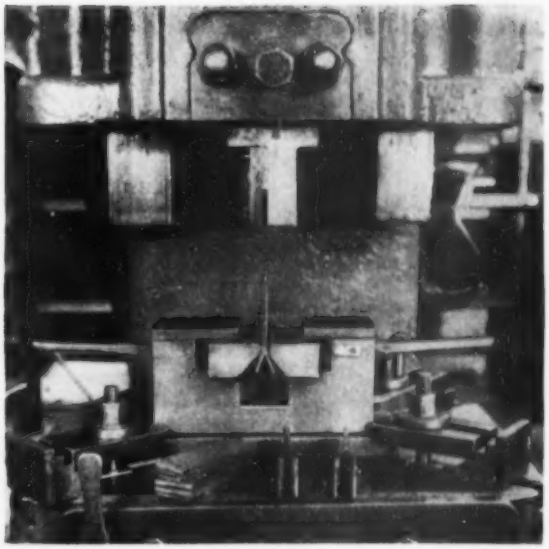
In the manufacture of cartridge fuses, flanged, blade-shaped contacts were originally formed by folding flat copper strip together, allowing sufficient length for bending a flange at right angles to each side of the body. Later the body was machined to the desired blade shape, the flanges trimmed and pierced, and the entire contact plated. Besides entailing several operations, the process involved plating problems because acid, used in a prior dip, was trapped in the groove formed by the fold. After plating, of course, corrosion occurred so it was necessary to plate before folding and bending, thereby increasing production costs.

The problem was solved by using copper blanks of the thickness needed for the blade and splitting them partially along the vertical axis to form flanges, thus leaving a solid blade section. Flanges are then bent at a 90° angle to the blade and pierced with mounting holes.

For the parts being made in this manner, the small amount of



HELD BY BALL-AND-SPRING DETENTS in a holder on the ram of a press, a blank is poised over a knife-shaped splitting tool on the press bed



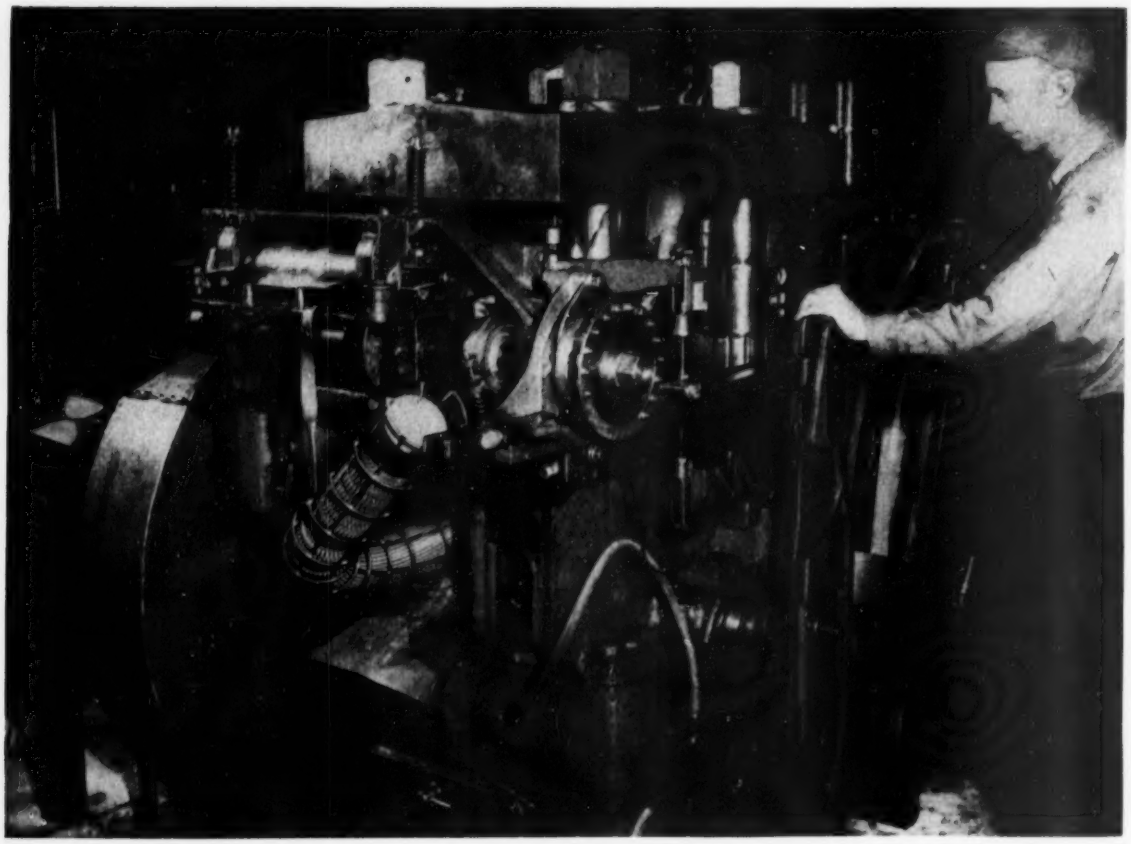
AFTER PASSING THROUGH GUIDE BLOCKS, a copper blank is split on the tool. Blank is stripped from the holder after splitting, then guide blocks are opened manually to clear blank for removal from splitting tool

shrinkage in length and the slight increase in thickness resulting from splitting the blanks is well within allowable tolerances. Either a hydraulic or mechanical press can be used—the blank being placed in a fixture on the ram where it is held in place by ball-and-spring detents. A knife-shaped cutting tool on the press table has guide-blocks for directing the work to it. These are opened manually after the splitting operation to provide clearance for the removal of the split blank. The guide blocks have relatively short bearing surfaces, the body being tapered for clearance to avoid contact with a blank that might force them open in the event of side movement during splitting. Most important function of the guide blocks is to prevent deflection of the blank during splitting. Close support by the holder on the ram and short length of blank outside the guide block keeps them straight.

Cutting edge of the splitting tool has a mirror finish for good cutting action and long life between grinds. When regrinding is needed it is important to shim the tool to bring it back to its original height. The greater the distance of the tool blade from the guide, the greater is the tendency of the blank to deflect, causing a difference in the thickness of each flange.

Most efficient angle for the splitting tool was found to be 30°, and a good grade of lubricating oil is freely applied to reduce friction. Nickel-chrome tool steel hardened to R$_c$ 54 gave the best results. Pressures up to 20 tons were required for splitting the full required length in copper blanks having a cross-section of 1 3/16 by 15/64. Stock with a cross-section of 2¾ by 5/16 in. was split in a 40-ton hydraulic press. Production rates varied from 400 pieces per hour for the smaller blanks, split in a punch press, to 120 pieces per hour for the larger blanks processed in the hydraulic press.

"Don't be silly, some of our men are going to a masquerade party after work."



DIE LIFE INCREASED 50% when a small gas-fired heater was installed between feed rolls and a progressive die used for blanking motor and generator laminations from high-silicon strip stock in Henry & Wright dieing machines

FLAME BEATS SUGAR FOR LENGTHENING DIE LIFE

High-silicon electrical-grade steel is heated to reduce die wear in making motor laminations . . . Here's how it's done

BY JOSEPH A GOODBAR
Die Foreman, Lima Works
WESTINGHOUSE ELECTRIC CORP.
LIMA, OHIO

BLANKING laminations for electrical motors and generators from special high-silicon (4½ to 5% Si) electrical-grade steel usually forces the pressroom foreman to double his standing order for headache powders—until he discovers solutions to problems imposed by this brittle, highly abrasive material.

Dies wear rapidly, and narrow sections of the laminations will crack or break off if the material is not handled properly. This leads to high tool cost per piece and to excessive rejects.

Use of a properly applied dry lubricant, and heating of the strip stock to about 220F immediately before feeding it through the blanking die are today the generally accepted solutions to both problems.

Until early in 1950, high-silicon lamination stock used by both the Sharon Works and the Lima Works of Westinghouse Electric Corp was

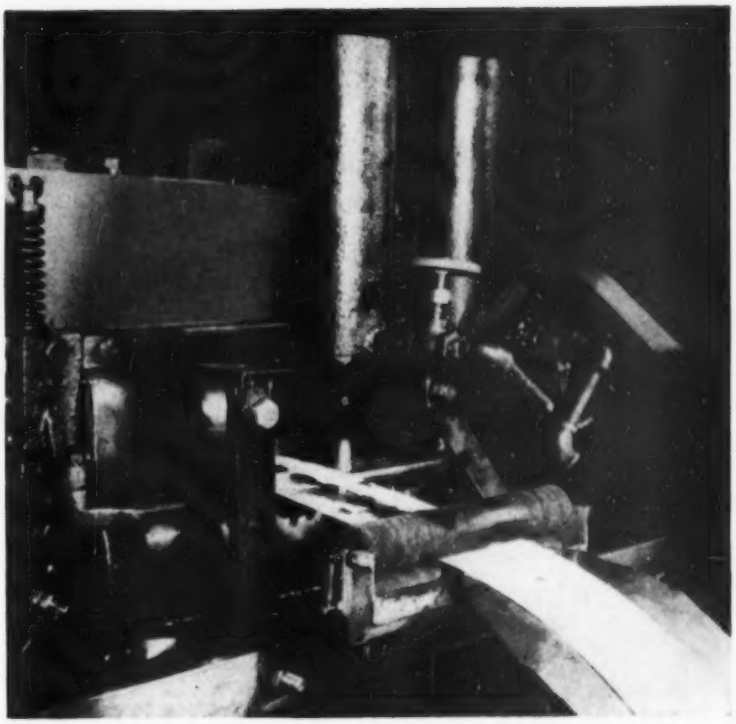
lubricated by applying a sugar coating. The solution applied consisted of 100 gal. of water, 300 lb of ordinary granulated sugar, and 3 lb of a proprietary red die. Coating was accomplished by heating the sheet to 170 to 200C, then passing it through a conventional roller coater which applied the sugar solution. The hot sheets dried quickly, so no additional drying was necessary.

This sugar coating was discontinued two years ago when tests proved that the improved Carlite coatings applied by the supplier of the steel (Armco Steel Corp) were superior in reducing die wear. Both the sugar coating and the Carlite coating soften when heated.

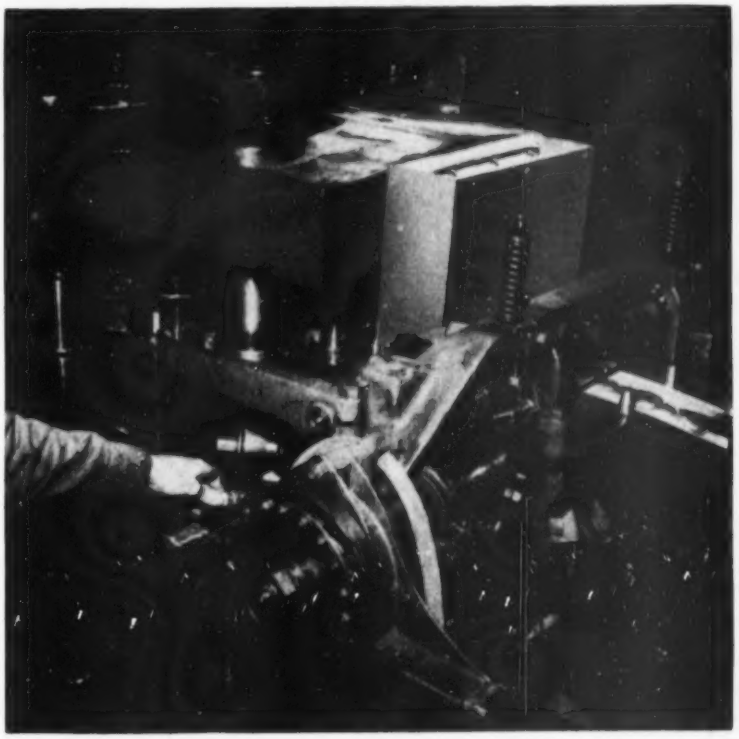
The thin strip stock (0.014 and 0.018-in. thick laminations are used) cools rapidly when removed from the heater, therefore quick transfer of the stock from the heater to the die is essential. At the Lima Works, where most high-silicon laminations are blanked in 100-ton Henry & Wright dieing machines, this was accomplished by developing a city-gas heater that can be mounted on the machine between the feed rolls and the die. It is enclosed so flames will not impinge on machine parts, and to confine the heat to the strip stock as much as possible.

In addition, a small roller coater has been added between the self-centering coil feed reel and the feed rolls on the machine, so the top of the strip can be coated lightly with kerosene, and a thin coat of light oil (about SAE 10) can be applied to the underside. As the strip passes through the heater, the kerosene flames and continues to burn as the strip passes into the die thus maintaining the strip at the desired temperature. The oil on the bottom surface helps keep the heat-softened Carlite coating soft as the strip feeds into the die.

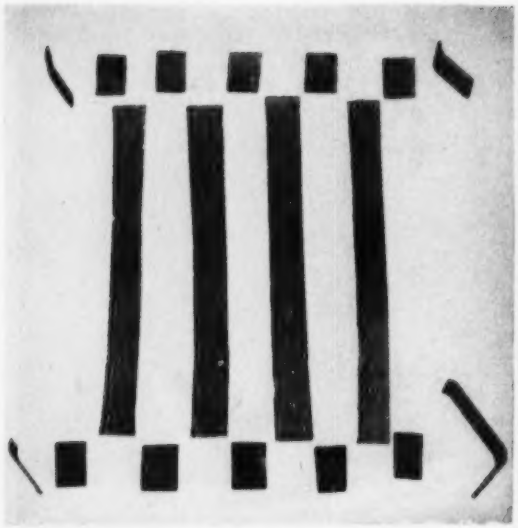
The gas heater developed for blanking high silicon electrical steel has also been applied successfully to the blanking of paper-base Micarta (laminated phenolic) plastic strip stock in 50-ton Henry & Wright dieing machines at the Lima Works. Oil and kerosene are not applied, however, when blanking small insulators from Micarta stock.



HOME-MADE ROLLER COATER mounted on end of dieing machine feeds kerosene to top of strip and light oil to undersurface as press feeds strip forward for blanking at 100 strokes per min. Vertical tubes above coater hold kerosene and oil, valves control flow to rolls



SINGLE VALVE CONTROLS GAS FLAMES in enclosed heater mounted between feed rolls and ram of dieing machine. Manual adjustment of flames is sufficient, as close control of temperature is not necessary. Operator sets flames higher if cracks occur in parts



FOUR-STRAP FLEXIBLE CABLE connector is brazed with phos-copper strips 0.005 in. thick. All parts for one end are preassembled, then placed under electrodes of spot welder for operation. Strip is precut to size. Operation is performed in 5 sec and there is no waste of brazing materials. Method assures maximum flexibility and reduces cost by 5% compared to brazing with a face-fed rod

Thin Phos-Copper Strips Speed Brazing

30% average reduction in the cost of brazing copper and copper alloys is obtained from preplaced phosphor-copper strip in thicknesses as low as 0.005 in.

BY R E BALLENTINE, Welding Engineer
WESTINGHOUSE ELECTRIC CORPORATION

PHOS-COPPER ribbon only 0.005-in. thick now is employed by the Westinghouse Electric Corporation for production-line brazing of copper and copper alloys. Developed by Westinghouse and rolled to this thickness at the Buffalo plant, the thin ribbon permits on the average job a 75% saving in brazing material, a 25% reduction in time of brazing, and results in a stronger, more ductile joint than could be obtained with former methods.

Although the advantages of preplaced brazing materials for joining flat sections have been known for some time, more expensive silver solders have been used because it has not been practical to do phosphor-copper brazing in this way. Until recently, no satisfactory strip of low-cost phosphor-alloy could be obtained. However, now that phos-copper strip can be rolled in 0.010- and 0.005-in. thicknesses, preplaced strips are proving successful on a number of non-ferrous brazing jobs. Transformers, motor and generator parts, water coolers, and heat exchangers are among the items now produced by this method. In some power-plant applications, bus bars up to 1x6 in. have been joined in this manner. As phos-copper requires no flux when making copper-to-copper joints, corrosion is no problem, and the practice of periodically taking apart and cleaning bolted connections is eliminated.

Makes Better Joints

As a clearance of only 0.0015 to 0.002 in. is recommended for the highest strength joint, the 0.005-in. phos-copper strip usually is satisfactory for most jobs. This clearance easily can be obtained in the finished joint by applying a slight pressure to the parts being brazed as the joint is heated. On melting, a portion of the brazing alloy is squeezed out to form a tiny fillet around the edge of the joint. This fillet serves not only to improve the appearance of the joint, but is an indication that the proper brazing temperature has been reached, thus avoiding overheating of the joint. The small fillet has another advantage in that it prevents the possibility of a sharp corner which may cause failure in use as stresses are concentrated at this point.

Phos-copper strip can be used in any of the various

brazing processes. However, it shows the greatest advantage in resistance or tong brazing, where the heat is built up by passing a high current through the joint held between two carbon or tungsten electrodes. Brazing pressure can be adjusted for any given value on a resistance brazing machine. If tongs are used, a spring pressure arrangement serves to hold the work together with the proper pressure for the job.

In furnace brazing or the more common torch brazing, the weight of one or the other of the parts usually serves to hold the two parts together. Here, if the parts are clamped together, the higher expansion of the nonferrous materials being joined usually exceeds that of the steel clamp, creating the required pressure.

When 0.010-in.-thick strip is employed, good practice is to cover only one-half the joint area; with 0.015-in. ribbon, only one-third the joint area. Thicker brazing ribbon, of course, requires higher pressures to bring the joint down to the desired thickness of about 0.002 in. In many cases the thicker ribbon requires more complicated jigs and fixtures, making alignment of the parts to be brazed more difficult. However, in joints where accurate alignment is not necessary, jigs usually are not required.

Requires Less Material

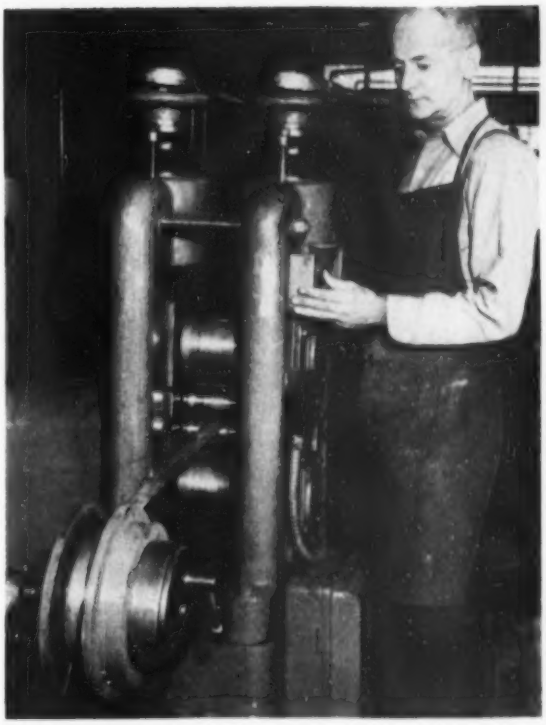
The 0.005-in. thick ribbon, although somewhat more expensive per pound than round rod, nevertheless offers over-all economy. Copper straps placed to overlap exactly 0.250 sq in. per joint were brazed with 0.005-in. ribbon and 3/32-in. rod. On the average, even with experienced operators, the rod required to make a joint was just a little less than four times the strip required, and the time for the rod joint was about 33% greater than that for the strap joint.

The technique of joining with preplaced strips of thin phos-copper ribbon conforms to the definition of brazing recently adopted by the American Welding Society. This definition limits the term brazing to those processes in which the filler metal is distributed between the closely fitted surfaces of the joint by capillary attraction. This definition does not exclude joints in which a filler metal such as strip is preplaced between the parts being joined, but rather considers that the wetting of the surfaces of the joint by the molten alloy in this case is the result of the capillary action. It does, however, exclude those processes wherein a *V* or fillet is built up.

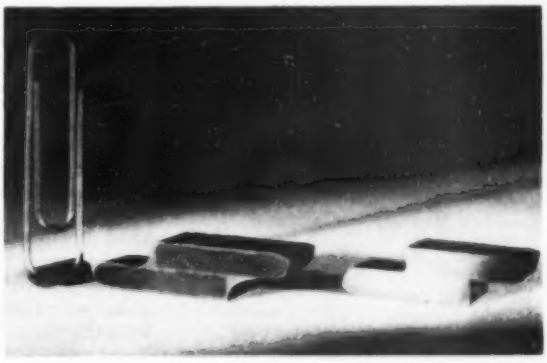
Avoids Poor Practices

To some extent, the practices of building up a large fillet or filling a *V* have retarded acceptance of phos-copper for brazing. Many welders, not aware of the proper procedure or even of what constitutes a good brazed joint, build up heavy fillets just as they would in braze-welding with a bronze rod. When joining with phosphorus-copper, this practice is not only wasteful of expensive brazing alloy, but, even more important, materially detracts from the joint strength. These alloys are brittle, especially in the cast state, and when a large cast area is built up, such as is done in an open *V* or fillet, the resultant joint quite naturally has the same properties as the filler metal. Even though the tensile strength of the brazing alloy may be two or three times that of the material being brazed, the brittle nature of the alloy makes it possible to fracture in the joint when the assembly is subjected to vibration or shock.

On the other hand, when a joint has been properly designed for brazing, and the alloy is drawn in by



ROLLING OF PHOSPHOR-COPPER to 0.005-in. thickness is performed on four-high mill. Strip, resistance-heated to 800 F, passes between rolls at 30 fpm, and is air-cooled as it winds onto reel in foreground. Electronic adjustable-speed drive maintains constant tension at all time during operation



BRAZED JOINT reveals saving of brazing material by strip method. Cross-section is of 1-in. thick copper strap

PRODUCTION BRAZING of commutator necks to bars for dc motors is at rate of approximately 400 pieces per hour. Pieces are assembled with precut strips of phos-copper and are placed in machine. Actual brazing time is less than 2 sec

capillary attraction, no such brittle area exists. The brazing alloy is present only in a thin film of 0.002- or 0.003-in. thickness or less. It is closely bonded to and backed up by the ductile materials being brazed. Consequently, it exhibits none of the brittle properties of a large fillet. Joints of this kind may be subjected to sharp and repeated vibration with no ill effect and almost invariably will be stronger than the parts being brazed.

Reduces Human Errors

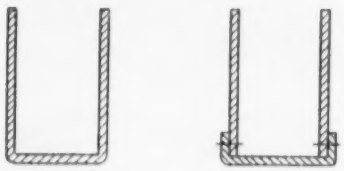
The quality of a joint made with phosphor-copper rod will depend not only on the joint design, but also on the operator's technique and ability to recognize a properly brazed joint. As the operator is one of the big factors in controlling quality, some manufacturers have been reluctant to use phosphor-copper even for copper and copper alloys for which the phosphor-copper brazing alloys were designed.

On the other hand, with the more ductile silver alloys, an operator may build up excessive fillets without destroying the joint's resistance to shock. However, this practice adds very little, if anything, to the strength of a joint and a great deal to the cost. Furthermore, the fact that such fillets have been built up often indicates that too low a brazing temperature was used, and that the alloy was not properly drawn in by capillary attraction. These disadvantages can be overcome with preplaced strips.

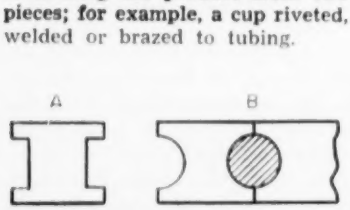
When you add to its cost advantages, the assurance that the joint is of top quality, ductile and strong, it is easy to understand the rapidly increasing popularity of thin phosphor-copper strips as a brazing material.

DIEMAKERS KINKS

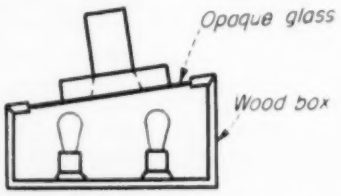
BY FEDERICO STRASSER



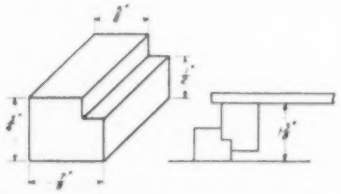
DEEP-SHELL drawing is not easy. If the height of shell exceeds the diameter, examine the possibilities of making the product from two pieces; for example, a cup riveted, welded or brazed to tubing.



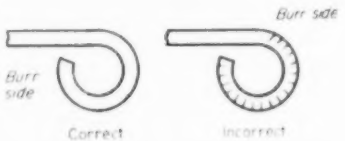
CHANGES IN SHAPE of die-produced parts may reduce their cost considerably. The product designer should always consult the die designer before definitely establishing the shape, dimensions and relationships of component elements. For example, part *A* with rectangular notched opening was changed to part *B* with half-round opening, because round holes are much cheaper to make than square ones.



PUNCH FITTING is made easier if punch and die can be placed on a "light box," in order to see where the members need retouching. Of course, this scheme is limited to fitting small dies.



SETUP BLOCKS should be standardized in dimensions. Then, when employed alone, in pairs, or in multiples of pairs, they can be used to obtain heights of say 1/2 in. upward in steps of 1/8 in.



IN CURLING operations, the burr side of blanks or shells should be on the inside of the curl, because this is the side of minimum stress and appearance is improved.

PROSPERITY IN THE USA: How Wealthy Are We?

Again, how prosperous *are* the people of the United States?

This is the third of a series of messages devoted to this crucially important and much-debated question. The first two messages dealt with what has been happening to our national income, both in terms of its growth and how it is divided among individuals.

This third message deals with what has been happening to the resources – factories, farms, mines, and equipment of all kinds – out of which income is created. It deals with what economists call our wealth.

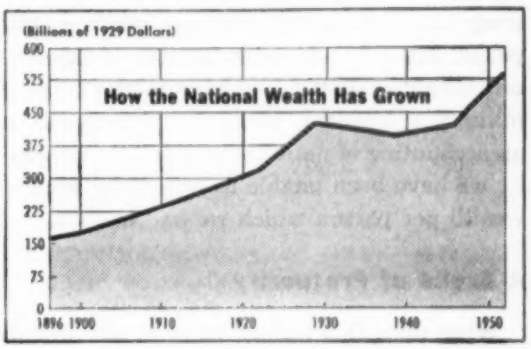
It is possible for a nation to enjoy apparent prosperity for a time by rapidly exhausting its resources. But to sustain prosperity over the long pull a nation must see that its wealth is not dissipated. Hence what is happening to our wealth now is a harbinger of what is going to happen to our prosperity later on.

How Wealth is Measured

It is often asserted that the most vital element in a nation's wealth is its people. There is a lot in this idea. For example, the full value of a country's hospital and surgical equipment depends on its physicians and their skill in handling the equipment.

However, no one has ever devised a satisfactory way to put a value on human beings. So people are omitted from calculations of national wealth. So, too, is military equipment. It is regarded as basically destructive and hence not a real addition to wealth. Otherwise, the wealth of a nation is calculated in terms of the dollar value of its physical resources.

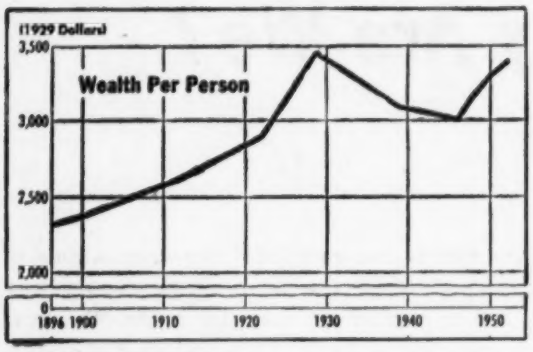
The following chart shows the wealth of the U.S.A. at various intervals during the past 50 years. For the period through 1948 the figures come from a pioneering study by Raymond Goldsmith of the National Bureau of Economic Research, which is widely regarded as the foremost organization in its field. The figures since 1948 are estimated. To remove the effect of price changes, all of the wealth figures are calculated in 1929 prices.



From this chart one fact stands out clearly. It is that since 1929 our national wealth has not been increasing as steadily as it did during

earlier periods. Indeed, in 1946 our total national wealth was actually less than it was in 1929. Only in the last six years have we been able to make any consistent additions.

Even these gains are less impressive when the growth in our population is taken into account, as illustrated by the following chart.



This chart makes it clear that when the nation's wealth is divided by the population, we are slightly worse off per person today than we were in 1929. This is the case in spite of the large additions to our national wealth since 1946.

Depression and war are the two principal reasons we have made no progress in increasing our wealth per person since the 1920s. The depression brought mass unemployment and greatly reduced production which ruled out any increase in wealth. During World War II and again during the post-Korean mobilization program, U.S. production has reached new peaks. But a considerable portion of this record breaking output has been in the form of military equipment, which is not included in an accounting of national wealth. Consequently, we have been unable to regain the level of wealth per person which we had in 1929.

A Brake of Prosperity

What does this failure to raise our wealth per person mean? It means that we have fewer resources with which to create income for each individual. It means that we have made no progress in the crucial task of assuring future increases in prosperity.

As the second editorial in this series demonstrated, we have gone so far in equalizing individual incomes that "the possibilities of increasing the income of the rest of the people by 'soaking the rich' have largely disappeared." From now on the only promising way to increase our individual incomes is to increase our national earning power.

During the past four years it has taken about $3.60 of national wealth to yield $1 of income after taxes. This is a low figure for the wealth needed. Prior to World War II there were long periods when it took at least $5 of national wealth to produce $1 of national income. The experts in this field are by no means certain that it will not again take $5 rather than $3.60 of wealth to increase income by $1.

But let us assume that $3.60 of wealth will suffice to provide $1 of income in the years ahead. If by 1960—seven years from now—the income of the average American is to be increased from about $1490, where it stands at present, to $2000, we must add $310 billion to the national wealth. This is nearly three times as much as we have added to our wealth since the end of World War II, seven years ago.

Because we have made large additions to our productive equipment in recent years, fears are frequently expressed that we shall soon be plagued by an excess of such equipment. But the facts about our national wealth do not support this conclusion. They indicate that we still have ahead of us a tremendous job of increasing our resources if the American standard of living is again to resume the steady climb which was interrupted by depression and war.

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ROUND TABLE

Chow Challenge

"I wish that darned personnel department would keep its nose out of our business," Ed ranted, as he and Al walked toward the front gate on the way home.

"What's the beef, Ed? What's got your cantankerous dander up now?"

"It's that new executive order about the lunchroom, Al. Didn't you see it?"

"Nope! I was so busy today I didn't even get a chance to look at the bulletin board."

"Well, it's a stinker. The boss laid down an edict that everyone has to eat lunch in the cafeteria—even the guys who save a buck by bringing in their own lunch pails. Silly isn't it?"

"Not so silly at that, Ed. I wondered if he'd get around to that one. I heard Robertson, the personnel manager, talking it up after our last foreman's meeting. His arguments were pretty good."

"Nuts! All it's going to do is cause trouble. The men aren't going to like leaving the shop, especially if they're forced to. More regimentation, that's all."

"What's unreasonable about leaving the shop for lunch? It's a good idea to change your environment once in a while. Besides, it might get some of the men to eat hot lunches, and that's always a good idea. And it will help keep garbage out of the coolant tanks, too."

"You're not going to get every man to eat a balanced meal just because he gets shoved into the cafeteria for half an hour every day. These guys don't give a rap for this modern nutrition business, and most of them actually prefer a few sandwiches and coffee to standing in line and toting a tray around until they find a seat."

"Maybe it'll take a while to break the lunchbox habit, but the extra break they'll get, and the better food some of them will try, are worth a few gripes. I'm sure we'll hear complaints, but they'll get used to it. They always do."

"It's the principle that bothers me, Al. Here we take a bunch of men who have eaten lunch around their machines for years, and force them to chase down the length of the plant. It won't do much for morale."

"I think you're wrong, Ed. It should do a lot for morale, and it should also help us get rid of those blankety-blank mice, too."

***IS IT** fair to prohibit lunch-box eating right in the shop? Who has the right to say where the men can or can't eat? Is the chance that better meals will be eaten worth the order and its consequences? What are your opinions on the question? Discussions of earlier topics appear on later pages.*

While automation systems often look quite simple, their development is seldom a simple process. To explain the steps involved and provide you with a checklist that will save you dollars and headaches in planning your automation, here's . . .

HOW FORD ORGANIZES AUTOMATION PROGRAMS

BY JOHN McDOUGALL*, Manufacturing Staff, FORD MOTOR COMPANY, DEARBORN, MICHIGAN

Automation is tied in with the future of our manufacturing industries, in the never-ending battle to reduce costs, increase volume, outsell competition, and increase the general standard of living. As such, it is a program that no industry can afford to overlook. However, a considerable amount of engineering study often is required before successful automation can be developed.

Who Heads the Program?

When an automation department is organized for extensive facility-expansion programs, you must start with a supervisor who has had considerable all-around experience in the field of conveyor, machine, and process-equipment design, and who can lead and coordinate the program as it develops. Under this man, you select a livewire supervisor who can lead designers in carrying out good engineering practice, with standardization and simplicity the keynotes. The designers must be specialists who have had experience in conveyor and machine design. The number required is dictated by the magnitude of the program and time allowed to complete it. The designer, in addition to his experience, must have imagination and the attitude that all operations can be performed automatically.

The first step occurs when the general plant layout has been agreed upon, and detailed layouts are in their early stage. One automation engineer should be given the responsibility for the work on a complete part, such as a cylinder block, cylinder head, hood, or fender. In this way, he will be able to get an over-all picture of the job, rather than a partial view. This is very important from a coordination standpoint. Naturally, on large jobs, the engineer in charge of a part study will need help.

In preparing the detailed plant layout, the layout man should call on the automation man freely for consultation in developing arrangements that lend themselves to simple equipment designs. At this stage, other interested parties from production, work standards, higher management, etc, are brought in for their comments on the over-all plan under consideration. Many quick calculations and simple sketches are made to determine in a preliminary way the extent of the automation that is justified.

In some cases, the right automation equipment will not cost much more than standard conveyances that would have to be used anyhow. The value of close coordination at this point, therefore, cannot be over-emphasized.

Is Automation Justified?

The parts must be carefully analyzed for adaptability to automation, and preliminary manpower estimates must be considered. We might find, for example, if one operator can load and unload several machines, or if an operator is required for other reasons, such as assembly, manual control, or observation, that automation cannot be justified.

Let us asume, however, that our preliminary study indicates the need for a system. Our preliminary work is done, and we now are ready to do the real job.

Copies of the plant layout are made, and the engineer starts his detailed study for preparation of the final recommendation. He must have copies of the Process Sheets on the job to be certain of obtaining correct machine tool and process equipment information as the job develops.

How Much Detail Is Needed?

An over-all preliminary automation layout is made to show all of the elements required, location, approximate size, etc. In some cases, it is necessary to make small scale models of the proposed equipment. Generally we need three-dimensional drawings to be certain of some features and to make proper presentation to Management for approval.

When we feel that our over-all study is completed far enough for final evaluation, the entire job is turned over to our estimating department for cost figures.

Our industrial engineering department analyzes the manpower required for the entire departmental layout, both with and without automation to show the actual requirements.

When we get answers to these two items, we then are prepared to make a report including: equipment costs installed, savings to be made and other benefits, preliminary layouts, details of some items which were made to be certain of their practicability, some three-dimensional drawings, and possibly, some scale models.

These data are summarized and the proper supervision within the department and in other divisions of Management are consulted for approval. Additional data are prepared if necessary.

*Based on a paper presented at the 4th Biennial Materials Handling Conference sponsored by Westinghouse Electric Corporation at Buffalo, N Y.

Ordering Automation Equipment

Let us assume that the program has reached this point and has been approved. When this occurs the following are the major steps that are taken:

1. The Plant Layout Section is notified of the approval. Consultations are held so final revisions to the layout or to the automation can be made before proceeding with the necessary steps to procure equipment.
2. The Process Department is notified so process sheets may be revised to include the effects of the automation equipment.
3. Tool and Die Design is notified. Consultation takes place here to be certain there is proper coordination. This is important so proper clearances are left in dies and tools for introduction of automation devices to load and unload work and, in some cases, to allow for the rejection of scrap material.
4. Final automation layouts are made.
5. Specifications and purchase notices are written so Purchasing Engineering can obtain proper bids. It is the policy of the Ford Motor Company to write specifications and purchase notices at the source of the design.
6. Specifications and purchase notices set up general terms and conditions. They include all general features necessary to a clear understanding of the job. Prints of the final approved layout are included.
7. Specifications clearly define the part under consideration, the work to be done, the materials required, etc. A description of each automation device is given, and an explanation of its function is included.
8. A point worthy of special consideration is the general policy that the contractor shall completely design, fabricate, machine, deliver and install all of the automation equipment and test it before acceptance by the company.

Dealing with Contractors

This point is of utmost importance. Automation equipment must be carefully designed from start to finish, and is a key item in the production process. It is not good business to split responsibility in jobs of this kind. There are cases, however, where it is good policy to work out many details beforehand to explain the job fully and indicate its full extent to the bidders.

Naturally, as the successful contractor progresses on the job, there are consultations with the Design Section originating the work and the purchasing department that placed the order, and, later, follow-up in the field to see that the job will operate as planned.

Working on Existing Layouts

The above outline assumes that the entire job was to be fabricated by contractors outside the company. This is not always the case, but has been generally followed on some of the larger programs being installed.

In the case of existing machinery, most of the same procedure applies. However, there are certain differences which should be noted.

The need for very careful field surveys is indicated. Very often, compromises may be needed to keep production going or to keep costs down. Of course, these factors should come out in the summary of all factors needed to get a decision on the program as a whole.

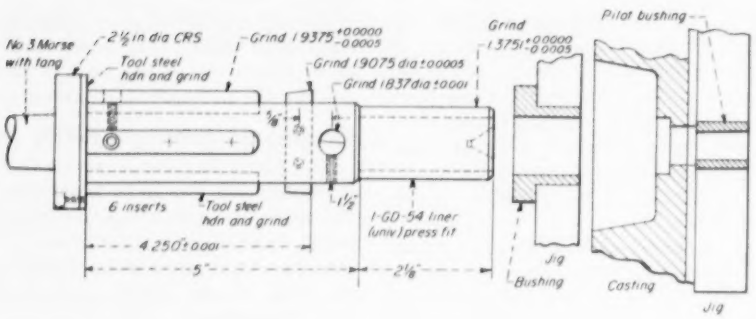
THIS GEAR HAS A SPLIT PERSONALITY

Sometimes, assembly operations or maintenance requirements govern the design and production of certain components. Such is the case of this 2-section diesel crankshaft gear which is split longitudinally.

The forging is rough turned and bored, leaving heavy flanges on each end to facilitate welding and give welds their required strength. The blank is then split helically along its axis and at the same angle as the helix of the completed gear. The two halves are brought together, clamped in a fixture and spotwelded on both ends. The blank is then finish-turned, hobbed, and shaved on a Red Ring gear-shaving machine. Positioning in the hobbing machine is controlled so the split coincides with the base of one tooth on each side. This gear has 54 teeth, 6-pitch, 16° 25′ RH helix, 20° PA and has 9.7045 in. OD.

The engine assembler cuts off the welding flanges which separate the sections, puts each section in place around the crankshaft and locks them solidly with bolted rings. These encircle the remainder of the flange behind the welding flange, which has already been removed.

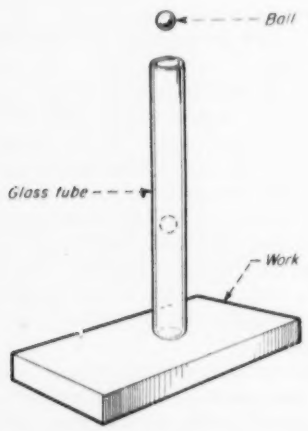
Practical Ideas



Piloted Boring Tool Guided by Drill Jig

To produce accurate holes in a casting, we developed the boring tool shown. Basically, the idea is not new, but two improvements added to this tool cut the manufacturing cost considerably. The bushing body is crs and contains a standard drill bushing, pressed on, and ground to size. Cylindrically-ground steel inserts ride in the upper bushing and the ground stop controls the depth of cut. As round hss toolbits are now available, the tool hole is jig-bored to size and the toolbit is pressed in and fastened with setscrews. Correct cutting angles and clearances are ground to suit the work to be bored. Thus the costly process of making square holes is eliminated.

This method will produce accurate large holes, with old equipment, as the in-line bushings provide the necessary bearing fit. *Stuart E Wadsworth, Homer, NY*



Improvised Hardness Tester

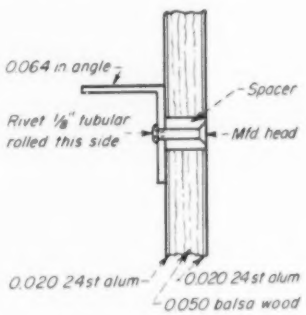
Relative hardness is frequently a valuable thing to know when working with steel; for machining, identifying, hardening, or tempering. File-hardness means very little as a true gage of hardness; depends largely on whether the file is sharp or worn, the type of steel, and whether the steel is heat-treated or case-hardened. Hardness of one unknown piece relative to that of a known sample can be determined by using a glass tube and a steel ball.

Work to be tested should be well supported, to prevent spring. Then, the glass tube is placed perpendicular to the work and as square as possible. The ball is dropped through the tube and the height of its bounce is noted. By repeating this procedure on the known sample, the higher bounce will indicate the harder material. *Frank M Buttrick, Alma, Mich*

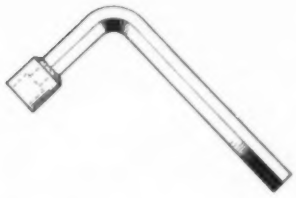
Spacers Strengthen Metal Sandwich Joints

Reinforcing angles were required in the corner joints of some boxes that we were asked to produce from laminated material. This material was balsa-wood clad on both sides with 24-ST aluminum sheet and the brackets were 2-SO aluminum fastened with ⅛-in. dia aluminum rivets. The sample furnished utilized a countersunk hole for the rivet, which was set against a conical spacer. It was covered with rejection stamps as delamination started under the spacer. The rivets used were solid, headed on the outside.

To improve the strength, I used

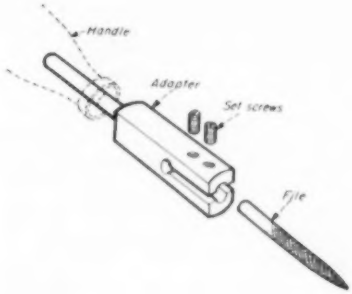


the fastening method shown. Joined by the new method, the boxes passed every test, including a few tests deliberately designed to wreck them. Spacers are made to a slightly larger diameter (1/16 in.) than the rivet head and to the same length as the stock thickness. Skin thickness determines the countersink diameter in the spacer. ⅛-in. dia tubular rivets, flat head and countersunk are used, with the manufactured head on the outside and are rolled on the inside. Drilling and counterboring are done in one operation and rolling the rivet sets the countersunk head into the spacer flush with the skin. Thus, there is no delamination. Rejects are minimized. Dipping the spacers into a bonding material improves their grip. *Donald W Hoffman*



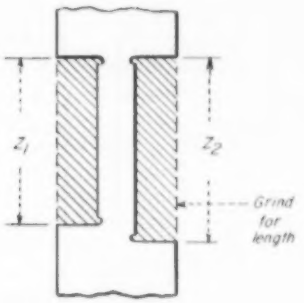
All-Purpose Wrench for Turret Lathe

All of the setscrews on the Warner & Swasey No. 2A turret lathe had ½-in. square heads. This included the turret toolholder setscrews and various other auxiliary tools constantly used in production. To hold the chuck on the spindle nose, ¾-10 sockethead capscrews were used. The latter have a 9/16-in. hexagonal socket in the head. By welding a ½-in. square socket to the end of a standard 9/16-in. hex key a single, all-purpose wrench is quickly available. If one other size is frequently used, a T-wrench can be made. Considerable time is saved over the old method of reaching for a different wrench for each operation. *Roger Isetts, Kenosha, Wisc*



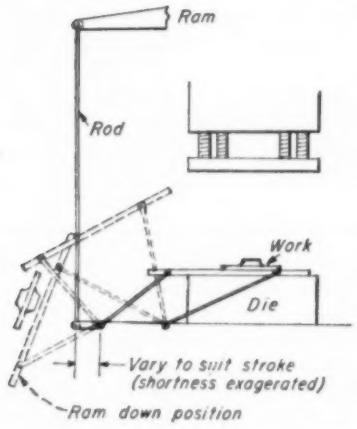
Broken Needle Files Salvaged by Handle

Diemakers using 4-in. needle files need no longer throw them away just because the handle snaps off. This practice represents a huge waste and it is easily corrected. A machine-steel adapter can be made as shown for use in a wood or plastic handle that will salvage the file and actually provides a more comfortable holding method. After turning, flats are milled or filed so that the resulting holder is the same width as the needle file. Two setscrews hold the file in place. Some people prefer to use this handle with new files too. *Edward Diskavich, Torrington, Conn.*



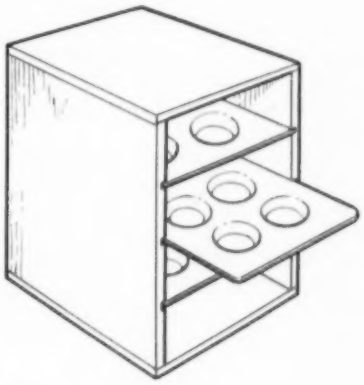
Emergency Gages From Hacksaw Blades

If you need a length, diameter, or thickness gage in a hurry and accuracy is not extreme, grind the gage from a wornout hacksaw blade. It is quickly accomplished and will work very well. The gage shown was used to sort similar workpieces of different lengths which had been accidentally mixed together. *Federico Strasser, Santiago, Chile*



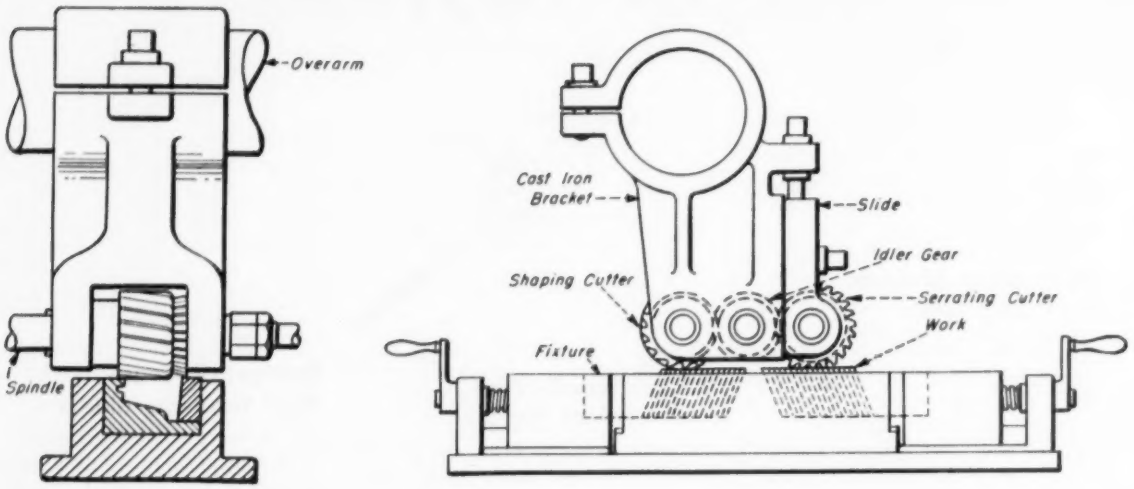
Automatic Press Unloader

For those presses doing a pierce or draw operation on parts too large to be readily ejected by air, disposing of the finished part after it drops from the stripper is frequently troublesome. Even on OBI presses, parts will stick when they are very oily or have projections. A mechanical unloader will overcome this difficulty. The design shown will work very well once the fundamentals such as the leg lengths and the length of the operating lever have been determined from the press stroke, work size, die clearance, etc. The unloader shown was used to eject a 6-in. dia forging after a piercing operation in a vertical back-geared press. The sketch can show only the principles as the dimensions are determined by the press used. The legs toward the center of the press should be as long as possible, to give the pan a good slope when the ram is in the down position. *F M Buttrick, Jr, Alma, Mich*



Small Parts Cabinet from Muffin Pans

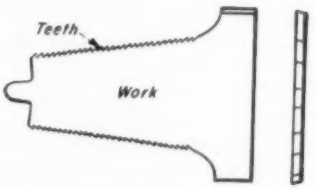
Kitchen muffin pans will serve very nicely as storage compartments for groups of small items such as screws, nuts, washers, and tacks. A wooden cabinet is made with slots cut in the sides to serve as slides to support the edges of the pans, which are inserted like drawers. Each cavity is labeled for one group of items. *Haim Murro, Boston, Mass*

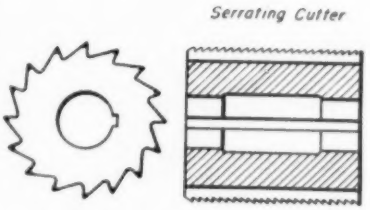


Multiple Serration Setup for Milling Machine

Ledger plates for mowing machines are usually made in either a special serrating machine or on a shaper. When the latter is used, one tooth, or less, is shaped per stroke and the process is very slow. The fixture and cutter arrangement shown will produce smooth, burr-free plates twenty times as fast as the shaping method.

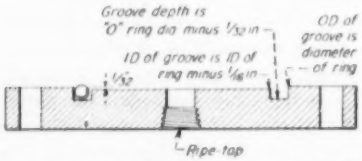
The milling attachment consists of a cast iron bracket which is clamped to the overarm on a horizontal miller. In this bracket runs the miller spindle, or an arbor, which carries one cutter for shaping the plates. This cutter is geared through an idler gear to a second cutter mounted in the vertical slide, which is free to move up or down in a groove on the cast iron support. Adjustment of the slide is accomplished with the two screws and this cutter produces the serrations. Both cutter driving gears are the same size, so that both cutters turn at the same speed. The fixture is loaded with 20 plates and is fed under the milling cutters. Plate contour is formed by the first cutter and the second cutter produces the serrations, all at the same time. After one side is milled, the plates are placed in the other side of the fixture, fitted for the contour, and the opposite side is cut. All 20 plates are at one pass, once the first ten are milled on one side. *Hjalmar Dahl, Upplands Vasby, Sweden*



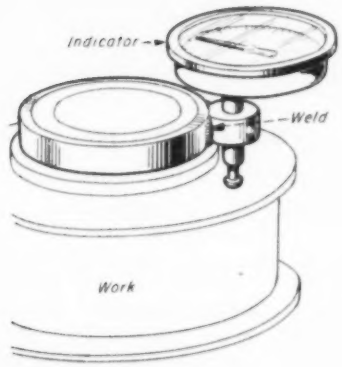


"O"-Ring Gasket Speeds Hydrostatic Test

We manufacture valves for many purposes and up to 36-in. dia in size. These valves are tested at twice their intended working pressure. Previous to our new technique, we bolted blind flanges to each end of the valve after inserting a cord-rubber gasket between each flange and the valve body. Then we filled the valve with water and applied pressure to 4000 psi. Frequently, the gasket would blow out and the men would get drenched with water. Also, time was lost in replacing the gasket and redoing the test.

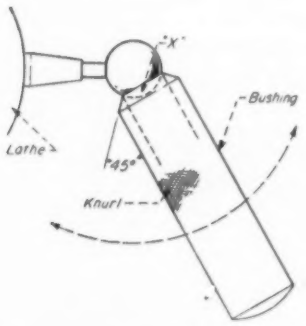


Then I saw an advertisement describing "O"-rings available in sizes up to 16-in. dia and I decided to make the test flanges shown. Now, with these flanges, it is only necessary to place the proper size ring in the grooved flange, place this flange against the valve flange, tighten the bolts, and test. Use of a wrench on the bolts is unnecessary. *Clarence J Lacher, Pittsburgh, Penna*



Holder Helps Indicate Shoulder-to-Flange

To gage the distance from the shoulder to the flange on some pistons we were making for lift-truck cylinders, we made the ring holder shown for a conventional dial indicator. A small ring, complete with setscrew, to hold the indicator shank, is welded to a larger ring which fits around the hub of the piston and bears on the shoulder. The contact point of the indicator rides on the flange. By rotating the indicator around the piece, we check both the distance and the runout between the shoulder and the flange. Of course, the ring is surface ground on the bottom so that it is perfectly flat and perpendicular to the centerline through the indicator hole. *Frank M Butrick, Alma, Michigan*

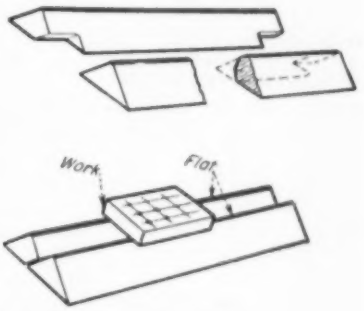


Simple Tool Speeds Spherical Shapes

Many fixture designs utilize ball-joints of one style or another. If these tools are to operate properly, swivel, and serve their intended function, each ball must be as close to spherical as possible. Here is one way to assure this quality: A plain steel drill-bushing is hardened and ground as shown, so that it contains a 45° chamfer, producing a knife edge, at one end. The part requiring a sphere is rough turned on the lathe to approximately produce the desired shape, then the sharpened bushing is hand-held against the turning workpiece, pressed, and rotated in an arc as shown. Chips curl off at the high points as the ground knife-edge shaves the ball surface. A perfect sphere can be generated and size accurately held. After cutting, the ball can be polished with light emery or rouge paper. Generally, the hole in the bushing should be 85% of the diameter desired on the finished ball. *Gordon W Richards, Allentown, Penna*

Knobs Cast in Small Permanent Molds

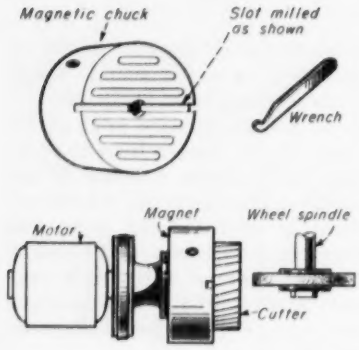
For a number of small machines produced in our shop, we use a standard binding screw on which we cast an aluminum knob. This is surprisingly simple, works very well, and has a pleasing appearance. We turn the screws on a turret lathe and knurl the end to be cast into the aluminum knob. These handles are produced four at a time as fast as the operator can load the studs, pour, and open and close the mold. After the piece has cooled, we collet the stud shank in a turret lathe, then finish machine and knurl the cast knobs. To date, we have not had a single knob separate from its shank. The mold is made with the knob cavity about ⅛-in. deeper than the finished knob length, to allow for the shrinkage depression in the casting. Steel is used for the mold and a simple clamp opens and closes it. Mold halves must fit tightly to prevent leakage of the molten metal and flash. *H J Gerber, Stillwater, Okla*



Triangular Parallels Improve Sensitive Drilling

Two small triangular parallels, ground from hardened tool steel so that they can be overlapped for small parts, will allow the *work* to move when the drill pulls to a center-punch mark. This action prevents drilling off center.

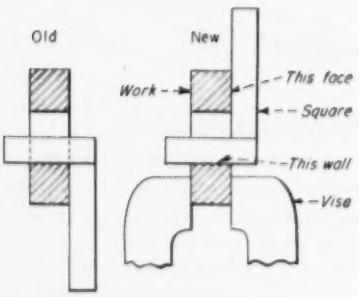
1/16-in. land along the top of each parallel serves as the bearing surface and offers little resistance to sliding. Also, it provides no opportunity for chips to accumulate. The triangular shape of the parallels prevents their tipping over and they will move away from the drill if touched by it. *Peter Opanowicz, Newark, NJ*



Magnet Speeds Face-Grinding Setup

To shorten the time required for face-grinding cutters and cutter-sets having bosses that must be ground below the cutting edge, we mounted a permanent magnet in a chuck on a power driven head. First, a hole was drilled in the exact center of the magnet to allow for inserting a plug. This plug permits concentric positioning of the cutter on the magnet. The cutter is readied for grinding by simply slipping it onto the plug and releasing the shorting switch on the permanent magnet.

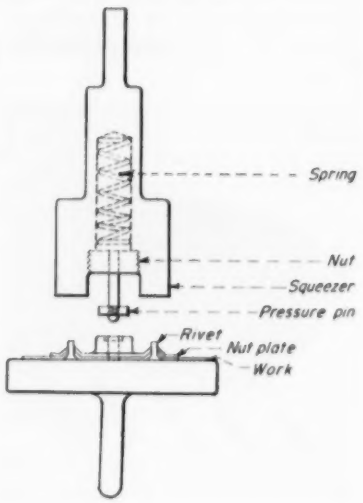
To remove the cutter from the magnet without getting cut on the sharp edges we cut a slot across the center of the magnet face and made a small wrench which is inserted under the cutter and pressed upward to release it. *Arnold Dyck, Long Branch, Ont, Canada*



Try-Square Work In Vise To Save Time

When hand-filing a hole in a die-plate, or similar work, it is necessary to frequently use the try-square to determine that the hole-wall is perpendicular to the die-face, or that the correct taper is present. Ordinarily, this is done by taking the die-plate from the vise, checking it, and reclamping it in the vise before filing can continue. This is necessary because habit causes the toolmaker to always check the hole-wall to the face closest to it.

To save time, leave the die-plate in the vise and place the outer edge of the body of the square against the filed surface and the square-blade against the opposite or upper surface of the die-plate. This procedure is equally accurate and much faster. *Federico Strasser, Santiago, Chile*



Nut-Plate Riveter for Press

Here is a simple riveting tool for riveter, kickpress, or arbor press. Spring-loaded pressure pin holds nut-plate firmly against material as squeezer completes stroke, to set both rivets at once. Make shank size to fit available riveters, or press, and shank length to suit shut-height.

Use of a dial and hopper feed will improve production. *Donald W Hoffman*

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PAYMENT—**$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.**

JUDGES — **A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.**

REQUIREMENTS — **Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.**

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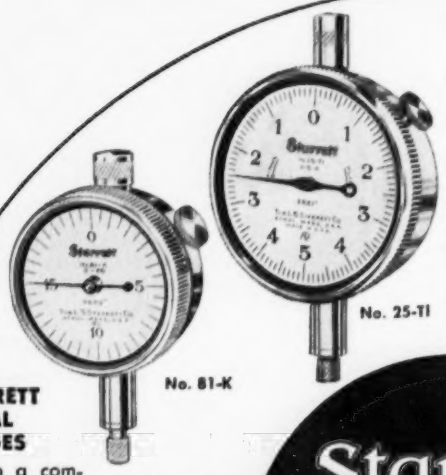

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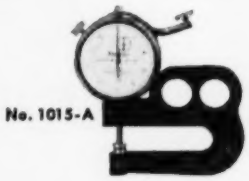

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Machinability of Cast Steels...I

Abstracted from Research Report No. 27 published by Charles W Briggs, Research Director, Steel Founders Society of America from data developed by Norman Zlatin and J F Kahles, Metcut Research Associates, Cincinnati.

So little information has been published on the machinability of steel castings that: (1) there is a fallacious tendency to group all cast steels under one collective machinability heading, and (2) cast steel is generally machined at speeds considerably below those for comparable wrought steels.

Since microstructure is a more reliable criterion of machinability than hardness, an investigation was made to determine tool-life characteristics of carbide and HSS tools when machining a number of cast steels in various conditions of heat treatment.

The seven cast steels (plain carbon and alloy) studied represent diversified types widely used by industry. Microstructure of most other cast steels can be correlated to the tested steels for the purpose of estimating economical machining rates.

Steel castings in many cases are delivered to the customer in the normalized condition. This is not necessarily the best heat treatment to produce optimum machining properties. Of course, heat treatment for ideal cutting speed may not be practical, especially if production requirements are not large enough to provide tool and time savings offsetting additional heat treating costs. Strength and application requirements must also be considered. Nevertheless, by knowing and using machining rates applicable to the microstructure in hand, definite economies should be realized as compared to blindly following rules of thumb.

General Conclusions:

1. In some cases, it is possible to improve machining characteristics as much as 100 to 200% by heat-treating the cast steel for a more machinable microstructure.

2. Necessary physical properties should not be forgotten in an effort to improve machinability. For example, a blocky ferrite-coarse pearlite structure cannot be expected to provide high impact resistance at lower temperatures.

3. Hardness, alone, cannot be used as a criterion for predicting tool life in cutting of cast steels.

4. For a given structure, the plain carbon steels possess better machining properties than the alloy steels.

5. Tool life of carbon (1040) cast steel, when machined with carbides, varies as the ratio of ferrite to pearlite in the microstructure, the 60:40 ratio machining best.

6. To obtain equivalent tool life, the skin of a cast steel should be machined at about one-half the rate for the base metal.

Test Methods

Test bars, 3½x18 in., pressure blasted but with the casting skin not touched, were heat-treated according to Table I. For turning tests, carbide tips were 78 B Carboloy

TABLE I ... HEAT TREATMENTS OF CAST STEELS TESTED FOR MACHINABILITY

STEEL TYPE	NO.		HEAT TREATMENT, DEG. F.
Carbon	1020	Annealed	1650 F (3 hr) F.C.; 100 F/hr 1300-1100F
Carbon	1020	Normalized	1650 F (3 hr) A.C.
Carbon	1040	Double Normalized	1700 F (2 hr) A.C. 1550 F (2 hr) A.C.
Carbon	1040	Normalized and Annealed	1700 F (2 hr) A.C.; 1600 F (2 hr) F.C. 80F/HR 1300-1200 F
Carbon	1040	Normalized	17000 F 1700 F
Carbon	1040	Normalized and Oil Quenched	1700 F (2 hr) A.C. 1550 F (2 hr) OQ.
Med. Mn	1330	Normalized	1650 F (3 hr) A.C.
Med. Mn	1330	Normalized and Tempered	1650 F (3 hr) A.C.; 1275 F (3 hr) A.C.
Cr-Mo	4130	Annealed	1650 F (3 hr) F.C.; 60 F/hr 1300-1000 F
Cr-Mo	4130	Normalized and Spheroidized	1650 F (3 hr) A.C.; to 1275 F (2 hr); 1375 (1 hr) F.C. to 1225 F (6 hr) A.C.
Ni-Cr-Mo	4340	Normalized and Annealed	1650 F (3 hr) A.C.; 1600 F (2 hr) F.C. to 1225 (8 hr) F.C.; 1050 F A.C.
Ni-Cr-Mo	4340	Normalized and Spheroidized	1650 F (3 hr) A.C.; 1275 F (2 hr); 1325 (1 hr) F.C. to 1225 F (8 hr) A.C.
Ni-Cr-Mo	4340	Quenched and Tempered (300 BHN)	1650 F (3 hr) A.C.; 1550 F (3 hr) WQ; 1150 F (2 hr) A.C.
Ni-Cr-Mo	4340	Quenched and Tempered (400 BHN)	1650 F (3 hr) A.C.; 1550 F (3 hr) WQ; 900 F (2 hr) A.C.
Ni-Cr-Mo	8630	Normalized	1650 F (3 hr) A.C.
		Annealed	1650 F (3 hr) F.C.; 40 F/hr 1300-1100 F
Mn-Mo	8430	Normalized and Tempered	1650 F (3 hr) A.C.; 1200 F (3 hr) A.C.
Mn-Mo	8430	Normalized and Tempered	1650 F (3 hr) A.C.; 1275 F (6 hr) A.C.

F.C. — Furnace Cooled. A.C. — Air Cooled. O.Q. — Oil Quenched. W.Q. — Water Quenched.

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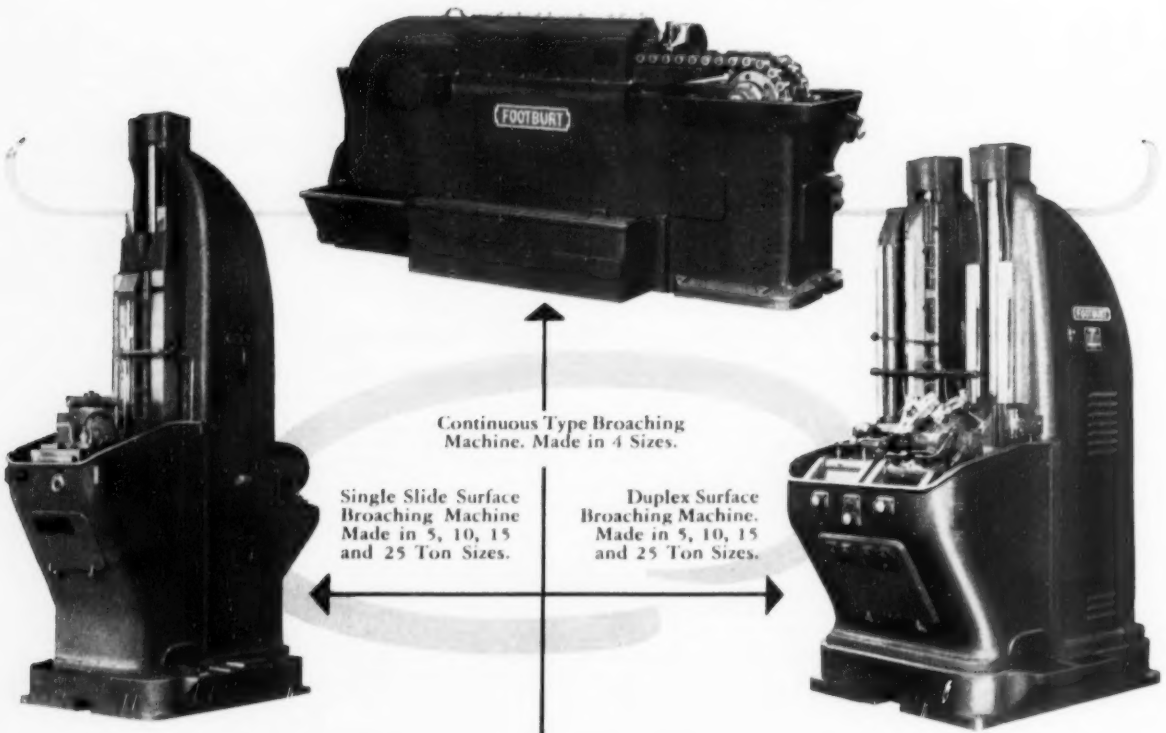
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Machinability of Cast Steels...II

blanks (a general-purpose steel cutting grade), ¼x½x⅝ in. HSS tools of 18-4-1 composition were of two sizes: for skin tests—½x½x4 in.; for base metal tests—¼x½x2 in. Tools were ground as follows:

	TOOL GRINDS HSS	Carbide
Side rake, deg	15	6
Back rake, deg	0	0
End cutting edge angle	5	6
Side cutting edge angle	0	6
Relief	5	6
Nose radius	0.005	0.040
Depth of cut	0.062	0.100
Feed, ipr	0.010	0.010

Tool-Life Determination

Final tool life point for HSS was determined by complete breakdown of the tool nose or a wearland of 0.060 in. on the flank, whichever occurred first. End point for carbide tools was either flank wear of 0.015 in. or localized failure of 0.040 in. Carbide tests were run dry, whereas for HSS a soluble-oil mixture of 25:1 was used.

Machinability Curves

Data on the machining of seven cast steels are plotted on tool life *vs.* cutting speed charts. Each of the accompanying sets of curves gives metal removal for HSS and 78 B general-purpose carbide. These tests prove conclusively that microstructure has a marked effect on the machinability of cast steels.

Recommendations:

It is recommended that plain carbon cast steels be machined with carbides in the cutting speed range of 400 to 600 fpm, and the alloy cast steels in the range of 200 to 400 fpm. HSS tools should be used in the range of 40 to 180 fpm.

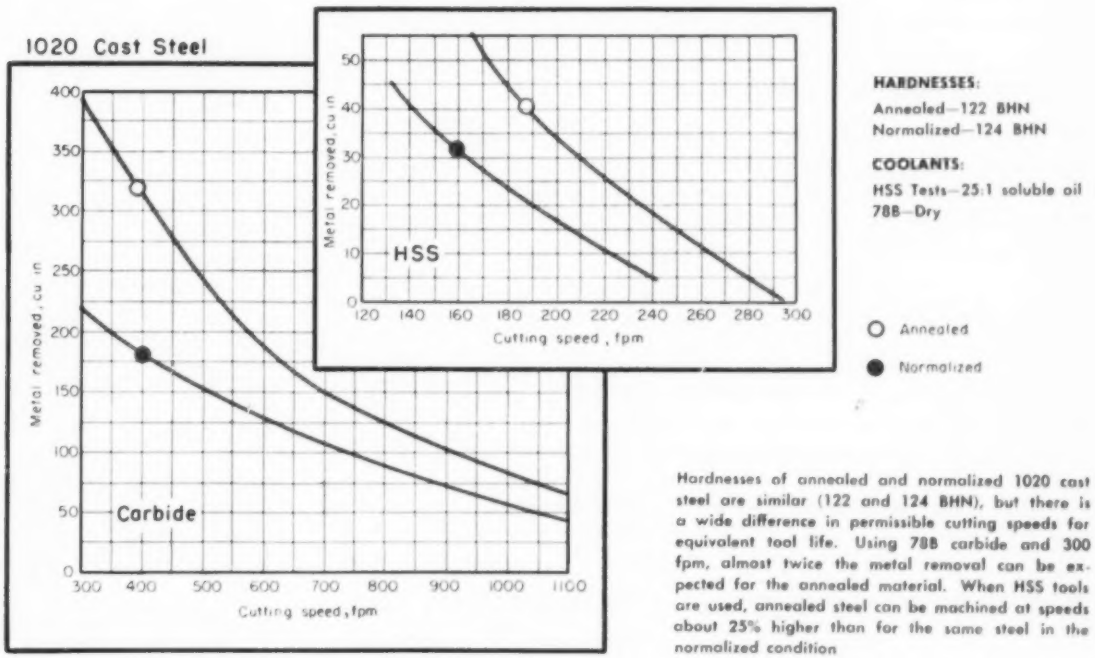
Skin Effect

Casting skins machined in these studies represent about the poorest surface conditions obtainable in steel castings. Misconceptions regarding the machining properties of cast steels have arisen from the fact that much commercial machining is done on the skin of a casting. Pending further studies, it will be logical to assume an intermediate value between the reported skin and base-metal values, as the probable conditions for machining the skin of commercial castings. Heat treatment seems to have little effect on the machining characteristics of the skin. The skin effect is more serious with forgings and castings than bar-stock, because majority of metal removed is skin.

Power Requirements

In terms of hp/cu in./min., power requirements for HSS tools in the speed range of 50 to 100 fpm, and for carbide tools in the speed range of 200 to 800 fpm are provided in Table II.* Feeds range from 0.005 for 0.015 cpr. The power requirements for HSS tools generally follow Brinell hardness, but this is not necessarily true for carbides. Also, abrasiveness of a given microstructure is not considered. Even though power requirements for a given steel are low, the tool life may be short because of abrasive constituents.

* *See next instalment.*



Hardnesses of annealed and normalized 1020 cast steel are similar (122 and 124 BHN), but there is a wide difference in permissible cutting speeds for equivalent tool life. Using 78B carbide and 300 fpm, almost twice the metal removal can be expected for the annealed material. When HSS tools are used, annealed steel can be machined at speeds about 25% higher than for the same steel in the normalized condition

Production News

ABOUT *Lusol*.. —THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY, INC. • PORTLAND, CONNECTICUT

USERS' ENTHUSIASM FOR *Lusol* SPREADS FAST FROM SHOP TO SHOP

Machine operators and their bosses, too, learn firsthand how Lusol speeds their production, lengthens tool life and makes working conditions more enjoyable. Then they tell the story around town and, soon, we get a phone call, "Show me!" The following stories are typical of many we've picked up from Lusol users all over the country.

"A new machinist

heard that drill 'screaming for help' and suggested trying Lusol there. Since this 2½" drill costs $60 and we had to sharpen it several times in drilling a hole 3" deep, we really saved money with Lusol. Now the chips come out cool and we drill 7 or 8 pieces between resharpenings."

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we are welding stainless steel strip into jet engine exhaust pipes. That weld line machined badly and caused smoking. Our principal manufacturer recommended Lusol, which we put in a year ago last November. We're getting a beautiful finish, increased speeds and feeds, longer tool life and no smoke."

"Here in our own plant

the foreman of our lathe department saw us having trouble grinding silver off steel bearing-retainer-rings. The wheels would load up instantly and gouge the steel. Wheel manufacturers tried many different abrasives, but with no luck. We put a Lusol solution into those grinders and now our ordinary wheels do the job. 20 micro finish!"

"A grinding wheel salesman

told me that wheels (a competitor's, too) weren't our trouble. We were rough-grinding only 3 to 5 pieces before the wheels needed redressing. He suggested a change to Lusol, and now we grind 20 pieces with one wheel dressing. Of course, we're buying his wheels now."

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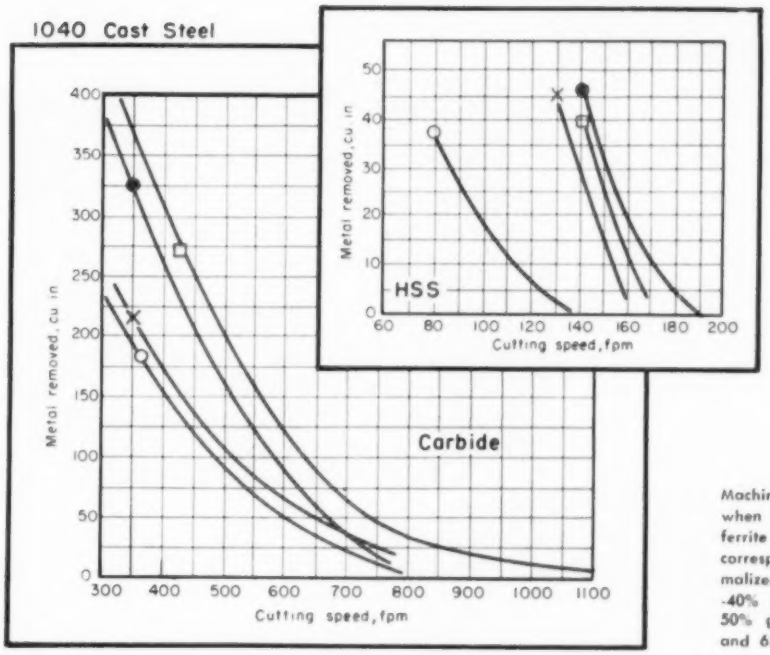
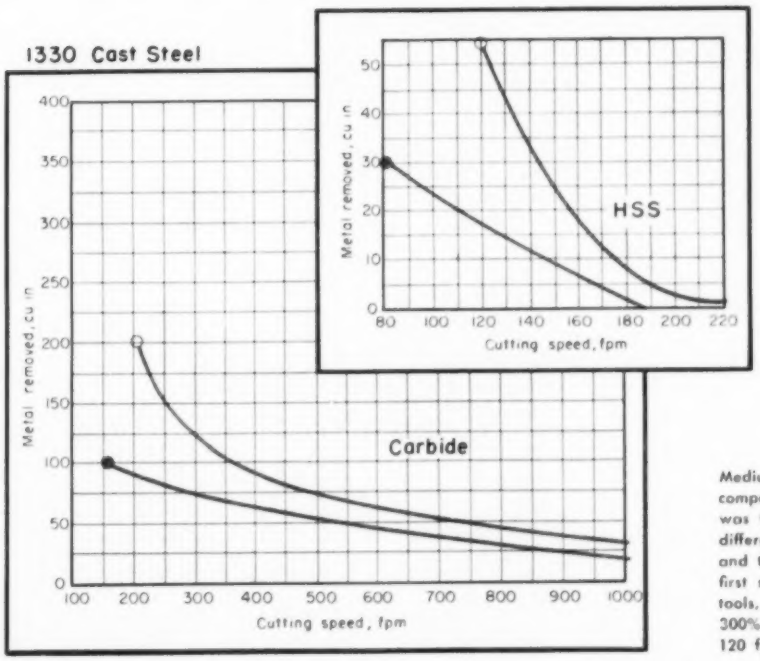
Machinability of Cast Steels...III



HARDNESSES:
Doubled normalized—185
Normalized & annealed—175
Single normalized—190
Normalized & oil quenched*—225
*Structure found in thin, normalized sections

□ Double normalized
● Normalized and annealed
× Single normalized
○ Normalized and oil quenched

Machinability of four heat-treated forms of 1040, when cut with carbides, is proportional to ratio of ferrite to pearlite. With HSS, machining properties correspond closely to Brinell hardness. Double normalized has a microstructure of 60% blocky ferrite -40% pearlite, machines with carbide at speeds 50% greater than single normalized (35% ferrite and 65% pearlite)



HARDNESSES:
Normalized & tempered—160
Normalized—187

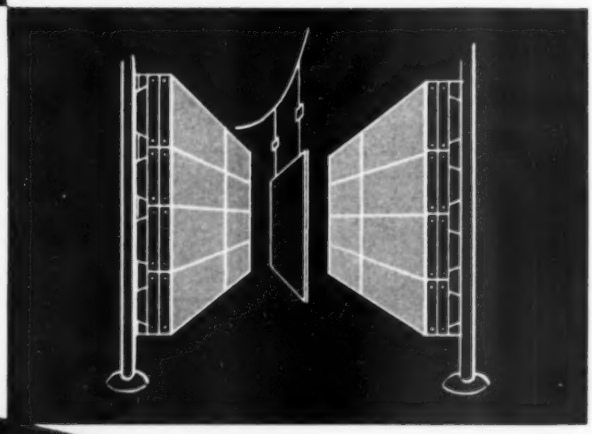
○ Normalized and tempered
● Normalized

Medium manganese steel (1330) machines poorly in comparison with other cast steels. Hence, carbide was tested at speeds down to 150 fpm. Hardness difference between normalized and tempered stock and the normalized form is only 27 points, but the first structure machines 125% faster. If using HSS tools, you can temper normalized steel and get 300% increase in tool life at a cutting speed of 120 fpm

Armco ALUMINIZED Steel solved this reflector problem

Heating panels for intense infra-red radiant heat need reflectors that are efficient, long-lived and rugged. A prominent manufacturer of electric radiant panel units has found that Armco ALUMINIZED Steel meets all of these requirements.

His reflectors operate on a wave length of 4 microns at 900 degrees F. Even at this temperature the aluminum coating stays bright. It maintains its reflective efficiency because of its resistance to oxidation, and protects the steel base.



the steel base means strength

In addition to their excellent heat-reflectivity, panels made of Armco ALUMINIZED Steel assure rugged strength. Corrugations in the steel give rigidity to "take" hard knocks and vibration at the 900-degree F reflector operating temperature.

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Armco ALUMINIZED Steel is used for its heat reflectivity, and resistance to a combination of heat and corrosion. Applications include automotive tail-pipes and mufflers, furnace combustion chambers, oven liners for kitchen ranges and electric toaster inner parts. The grade is produced in sheets and coils 12 through 30 gage—up to 48 inches wide in certain gages.

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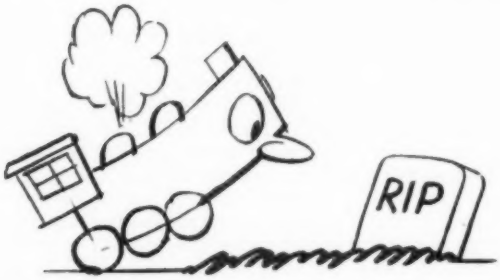


Exaggerated

MARK TWAIN, it is said, was once startled to read a report of his death in a prominent newspaper. He thereupon wrote the editor: "The report of my death has been somewhat exaggerated." Somewhat the same sort of thing has happened to the steam locomotive. All sorts of news magazines have predicted—and hailed—the demise of the steamer. A recent book, quoted in *Newsweek*, pictures the final Baldwin steam locomotive, delivered Jan 1, 1949, and calls it the last US steamer.

The author had better check his facts. The Norfolk & Western Railway, which has built its own locomotives for 27 years, has built 60 since 1949—of four different types. The Roanoke, Va, shops have built some 450 locomotives since 1884, when the shops were built, is still hard at it. During World War II, the output was above two locomotives per month, not counting rebuilding and maintenance jobs. The shops can produce twice that, if required—and could get foreign orders, if desired.

Palletizing

"WE WOULD PREFER to palletize as many shipments as possible to save space, to save on material handling, and to save on packing material," said R G Druschky of Wagner Electric Corp recently. He gave this example to point up savings possible through palletization: "Sixty motors packed in individual cartons require 665 sq ft of fibre board. These 60 motors would then occupy 36 cu ft. The same 60 motors, palletized, require 194 sq ft of fibre board with a cubical occupation of only 27 cu ft. There is a saving of approximately 70% of the fibre board and 25% of the cubic space occupied. In addition to this, the cost of individual cartons for the same 60 motors would be $12.80, while the cost of the material for a palletized shipment would be $4.99, or a savings in material of 60% of the individual package. Remember also that every pound saved in packing will be reflected in transportation costs."

Costly Family

PLATINUM-TYPE METALS are steadily increasing in industrial application. Platinum is used at a rate of about 210,000 oz per year, palladium at about 220,000 oz, although the former has a ceiling of $93 per troy oz. Rhodium, ruthenium, iridium, and osmium, of the same general group, are also being applied. Spinnerets for rayon are made of platinum-rhodium alloy, those for glass fiber are platinum alloy. Platinum makes the electrodes for aircraft spark plugs, is the catalyst in making high-octane gasoline. Palladium is also a catalyst and widely used for electrical contacts. Containers for hard-to-handle materials are also of palladium, which has a white color much desired in jewelry. Rhodium-plated mirrors for projectors and rhodium-plated lighters and razors are also made. The other three metals are applied principally as hard tips for fountain-pen nibs.

Speed Saw

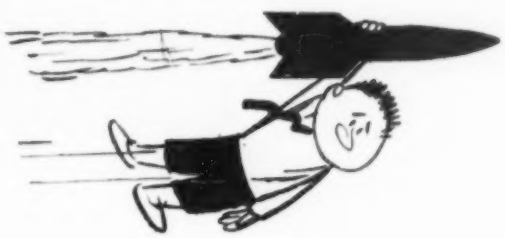
ALUMINUM can ordinarily be cut at almost any surface speed, with carbide. For example, one company slots an aluminum collar about ¼ x 1 in. with a 5-in.-dia, 6-bladed, carbide-tipped cutter running at 2400 rpm. Thus cutting speed is 3140 fpm. In another plant, a carbide saw 0.036 in. wide and 5 in. in dia cuts 14 slots per min. While HSS saws cut only 600 slots before dressing, this one has cut 15,000, and is still going strong. Its cost of $65 has already been overbalanced by saving 25 regrinds. For such work, carbide of the 883 type works well, regardless of silicon content in the alloy.

Less Chipping

DROP-FORGING SIDE RODS for mountain-type locomotives avoids removal of 750 lb of chips—a considerable matter any time, but particularly important if the material is Timken bearing steel. The Norfolk & Western Railway has, as a consequence, adopted drop-forged rods. This also results in better grain structure.

Practically

A HAMBURG TOY COMPANY has developed rocket-driven toys, especially airplanes, for the export trade. Says the description: "These attractive toys render a very realistic performance. The rocket, when ignited, makes a terrific noise and a powerful trail of fire shoots out of the vehicle's rear part. . . . If handled with proper care, the toy is practically harmless." Having once hand-launched a skyrocket, we are particularly conscious of that "practically harmless." Harmlessness exists or does not—no limiting adjective or adverb can modify it.



News of Metalworking

URGE STANDARDIZATION OF FLOOR TRUCKS

CHICAGO — Standardization of manual materials handling equipment is the objective of an industry-wide campaign recently launched here by the Caster & Floor Truck Manufacturers' Association.

To achieve its goal of greater interchangeability of parts and applications, CFTMA is asking cooperation of all firms and persons involved in the design, production and use of products in the caster, wheel, hand and floor truck classification.

Individuals and groups interested in contributing information and suggestions are asked to write Equipment & Standardization Committee, Caster & Floor Truck Manufacturers' Association, 27 East Monroe St, Chicago 3.

ISRAEL TO GET $2.5 MILLION COPPER REFINERY

TEL AVIV—Construction will start shortly here on a $2.5 million copper refinery capable of producing 10 to 15 tons of pure metal daily. Israel Mining Corp, government-monopoly on mineral resources, reports ore-enriching experiments in the Southern Negev desert are reaching a successful conclusion. This will open up exploitation of deposits believed to contain 200,000 tons of copper. Local ore contains about 1% copper and must be enriched through removal of impurities before it assays the 15% necessary for refining.

ENGINEER SHORTAGE HAMPERS '53 EXPANSION

NEW YORK—America's engineer shortage will again keep industry from attaining full production and expansion goals in '53, T A Marshall, Jr, executive secretary, Engineering Manpower Commission of Engineers' Joint Council, said here, in launching an industry-wide campaign with the help of the Advertising Council to encourage high school students to take up engineering as a career.

"Right now," he declares, "There is need for 40,000 new engineering graduates for industrial and civilian governmental needs alone without considering the needs of military services or education." Total engineers graduating in '53: 23,000.

Bethlehem Ingots Pace Air Force's Giant Forging Press Program

BETHLEHEM, Pa—Manufacture of components for 17 huge die forging and extrusion presses called for in the Air Force's $400 million program for aluminum forging facilities went into high gear here recently with pouring of ingots for 103-ft long press columns.

While a number of press parts have already progressed through initial manufacturing stages at various plants, one of the program's most dramatic aspects started in mid-January at the Bethlehem Steel Co plant. Here, in about an hour's time, the first of 18 corrugated ingots, each weighing 275 tons and measuring 9 ft in diameter by 18 ft long, was poured. Succeeding steps will involve forging to a length of 108 ft, 16-in. thickness, a width of 42 in. at the center and 94 in. at the ends. The rough forgings will then be shipped to another facility for milling to 13-in. thickness.

Ten-Story Press

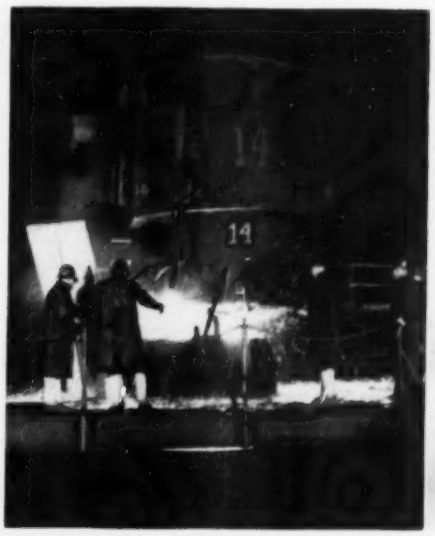
The Bethlehem forgings will become column laminations (3 used in each of 6 columns) in a 50,000-ton forging press being built by Loewy Construction Co for Weyman-Gordon Co's North Grafton, Mass. plant. The press will stand 10 stories high on a 100-ft deep foundation.

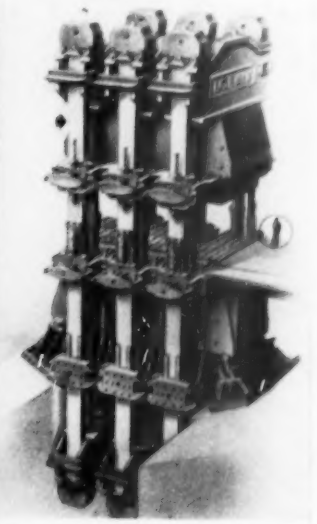
Use of laminated columns of rectangular cross-section is a bold departure from the one-piece cylindrical-column design conventionally employed in large forging presses. Ends of these laminations will be retained in "boxes" which will be part of the upper and lower members of the press.

The Case for Lamination

Laminated construction is considered more reliable than one-piece because (1) likelihood of serious flaws escaping detection in manufacture is less, (2) one lamination can take a set but still carry load along with its mates, and (3) failure of one lamination provides a signal to withdraw the press from service before a catastrophe occurs.

In pouring the huge ingot, Bethlehem used two open hearth furnaces. Timing was split second. A furnace was tapped and a ladle filled. The ladle was then spotted by crane above a pony ladle located over a





PRODUCTION OF AN ENTIRE OPEN HEARTH MILL at Bethlehem Steel Co was interrupted to pour a 550,000-lb ingot (left) for just one lamination of a 3-lamination column. Six of these columns (arrow, right) are required for the 50,000-ton Loewy die-forging press being built for Weyman-Gordon Co under the Air Force heavy press progam. The giant press (see comparative size of man in circle) will press out aircraft wings and other components

cylindrical sink head atop the mold proper, most of which was below floor level in a pit.

Before the first ladle emptied, the second open hearth was tapped to avoid waits between pours. Almost 100,000 lb of extra molten metal was poured into the sinkhead after filling the mold. This segregated impurities and filled the mold with sound metal. Subsequent cropping and machining losses cut finished forging weight to 220,000 lb.

In the near future after the mold is stripped, the casting's sink head will be lanced off the cherry red ingot, which will be transferred to a carbottom furnace in the forge plant. Here the steel will be brought slowly up to 2200 F.

An estimated eight heats will be needed to forge the piece. First, the forging will be blocked, then forged into dumbbell shape. Finishing will draw out the ends to the required 110 ft length.

No Cause for Worry Over Diamond Bort Supply: NPA Told

WASHINGTON — Industry has no cause to worry about US supplies of diamond bort for grinding wheels providing "conservation and salvage are rigidly practiced," Jan C. Taeyaerts, president of Precision Diamond Tool Co, Elgin, Ill., and head of a 14-man delegation of diamond wheel makers, told NPA officials here recently.

Mr Taeyaerts' statement was made in rebuttal to allegations made by silicon grinding wheel manufacturers at a meeting with NPA last October, when NPA officials were told that silicon carbide wheels could solve the bort supply problem by replacing diamond wheels in grinding of 90% of all tungsten carbide tools.

"No plant ever had to curtail its production for lack of diamond wheels," Mr Taeyaerts said, and went on to claim that while "silicon wheels have their place" they cannot be used for internal, form, thread or chip grinding.

Silicon carbide wheels are applicable to rough grinding operations but diamond wheels should be used on all finish grinding applications, NPA officials were told. Conversion from diamond grinding to substitute methods "would only create manpower and machinery problems."

Seven-Point Program

As spokesman for the diamond wheel industry, Mr Taeyaerts advocates a seven-point program.

1. To hold clinics to advise diamond users on how to recover diamond grain and eliminate waste.

2. To promote application of proper coolants by enlisting aid of machine tool builders in providing new grinder attachments.

3. To urge machine tool builders to adapt grinders to meet diamond wheel grinding problems.

4. To initiate a public relations program that will overcome labor union objections to wet grinding.

5. To prepare alternative plans for a national emergency: (1) if supply would *not* be cut off, and (2) if it *would* be cut off.

6. To wage a continuous campaign to educate users in operation of diamond grinding wheels. Government could take the lead here by establishing a technical bureau for study of proper procedures.

7. To study current carbide grinding methods, with a view to applying them to the betterment of diamond grinding practices.

Metalworking Abroad

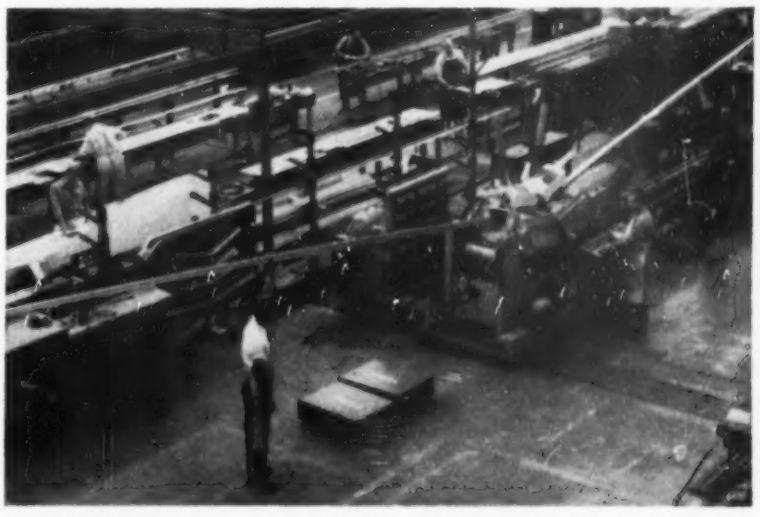
(By McGraw-Hill World News)

European steel production hit a new high in '52, the UN Economic Commission reports. Europe, including the Soviet Union, produced 109 million metric tons of steel during the year, an increase of 10 million tons over 1951 and an all-time record. Soviet Union and satellites produced 42% of the total, up 1% over '51. Western Europe upped its output by 8% to 62,970,000 metric tons. Greatest gain, 29% over the previous year, was reported by eastern Germany.

Manganese imports from Brazil will increase steadily as a result of a US government loan of $67 million to Brazilian manganese interests, and the signing of a long-term purchase contract that assures development of new manganese deposits for US use. Under contract terms, the US will get 70% of the 5½ billion tons of ore expected to be produced in Brazil in the next 12 years.

Nationalization of India's aviation industry, first major nationalization step to be undertaken by Nehru's government, will cost the country $18 million in new equipment and compensation to its nine airlines, most of which are running heavily in the red.

Industrial center on Canada's Fraser River, at Anacis Island, is in the embryo stage. Group of British manufacturers, including, it is reported, Austin Motor Co (Canada) Ltd, is negotiating for purchase of the site.



BEAM BENDER for Super-Constellation wing beam caps, now in operation at Lockheed's Burbank, Calif., plant, handles 75ST6 alloy beams up to 60 ft long. Heat up to 325 F is applied within machine at bending point, permitting accurate bends up to 50 degrees in less than 3 minutes

NAVY CUTS RED TAPE ON DEFENSE ORDERS

WASHINGTON—Navy has worked out a basic agreement for use of defense contractors that will cut out most of the red tape connected with large defense orders.

The agreement does not constitute a contract but sets up general provisions that can be included by reference in future contracts with a given supplier. Agreement, applicable to all cost-type contracts for hard or soft goods, is in two parts:

1. Mandatory provisions covering: inspection, supply responsibility, payments, assignment of claims, additional bond security, taxes, evidence of exemption, price adjustment and refund, default, disputes, patent infringement, labor laws, covenant against contingent fees, termination convenience of government, renegotiation of ceiling prices, security measures, etc.

2. Optional features agreeable to both parties, including: technical information, patent indemnity, progress payments, redetermination of contract prices, guaranty, withholding of payment, patent rights.

Copies of each basic agreement will be sent all Navy purchasing offices and interested government agencies. Agreements at first will be signed with only a few Navy contractors until flaws in the system are ironed out.

HANNA TO BUILD FERRO-NICKEL PLANT

RIDDLE, ORE.—M A Hanna Co has been given the green light by the Defense Materials Procurement Agency to build the nation's first commercial nickel plant here. Construction will start this summer, with annual output of 9000 tons getting under way sometime in 1954.

A substantial government subsidy is involved, since exploitation of the Hanna deposits would not be practicable on a purely commercial basis. One Hanna subsidiary, Hanna Coal & Ore Corp, will develop the low-grade nickel mine, while another subsidiary, Hanna Nickel Smelting Co, will construct the ferro-nickel smelting plant.

DMPA has advanced $24.8 million to the smelting company for plant construction, agreeing that if commitments are met by 1964, $22 million will be written off.

GM Motorama Marks Return To Annual Shows, Model Changes

NEW YORK—General Motors Motorama's spectacular display of 1953 models at the Waldorf-Astoria January 16-23 served public notice on the automobile industry that the old days of stiff battling for the retail market are back.

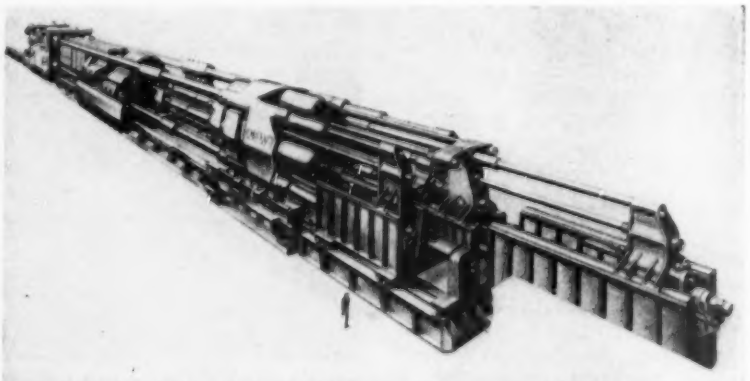
The first of its kind since Korea, the Motorama surpassed all previous General Motors' shows at the Waldorf in size, glitter, over-all expense and displays of radically new designs of experimental cars. At a press luncheon on January 16, Harlow H. Curtice, GM acting president, made these points clear:

- Annual shows as well as model changes are here to stay, as far as GM is concerned. "We believe very much in shows," he said.
- There are not likely to be any price reductions this year beyond the inclusion of some former "extras" as standard equipment.
- GM probably will build 3 million vehicles this year. First quarter schedule is slightly under 900,000 units, or 40% above last year's.
- GM probably will make 200-300 of the "dream cars" on display at the Motorama (such as Buick's Skylark, Cadillac's Orleans, Oldsmobile's 98 Fiesta) out of plastic, as a trial run. But as of today, "to make a car which we know would be entirely satisfactory to the owner, we would tool it to be made out of steel."
- GM does not expect a strike. It anticipates continuing to negotiate privately and "maintaining a very quiet front."
- Needs of the public probably will require an average industry output over a 5-10 year cycle of more than 5 million passenger cars a year.
- GM is not getting today all the nickel it requires to make car bumpers and external car parts long-lived and retain their brightness. Otherwise the material situation will ease after the first quarter as steel becomes more plentiful.

W. F. Hufstader, vice president in charge of distribution, told the press that General Motors is out to regain or surpass its 1940 and 1947 ratio of the industry's business—47% of passenger car sales. Recently its percentage has suffered from the GM strike and from Washington's allocation of materials.

About 15% of GM cars offering power steering were sold with that device the past year, Mr. Hufstader remarked. Since automatic transmissions first were adopted, GM has built and sold 5.7 million units. One out of every six purchasers now buys a convertible or a hard top.

Cadillac showed at the Motorama a sports convertible car with a glass fibre reinforced plastic body—the Le Mans. It is 51 in. high, or 5.3 in. lower than the standard Cadillac. Vertical bumpers, which appear to be part of the body, help to cut its length to 196.1 in. It has a single seat carrying three passengers behind a 250-hp V-8 engine. Three other custom cars by Chevrolet, Buick and Oldsmobile have plastic bodies. Pontiac's two custom cars have steel bodies.



GIANT 20,000-TON ALUMINUM EXTRUSION PRESS, to be installed at Alcoa's Lafayette, Ind., Works under the Air Force heavy press program, will push out extruded shapes weighing up to 2¼ tons for aircraft wing panels and spar caps.

Few Job-Hoppers Among Tool And Diemakers: Survey Reveals

WASHINGTON—The nation's tool and diemakers are pretty solid citizens who like to stay put in their jobs, a recent Bureau of Labor survey shows.

The survey covers an 11-year period from 1940 to 1951. Some 1700 tool and diemakers in seven major metalworking areas were interviewed as to their employment records. Here are the results:

- More than half did not change employers during the period.
- Of those who changed jobs, less than 9% moved to another city, and less than 5% were working in cities away from the region in which they were trained.
- Some 8% had worked outside their trade, but more than half of these held such closely related jobs as machinist, machinist-repairman or machine-tool operator.
- Most job hopping was done by a small group. Two-fifths of all wartime job changes were by about one-eighth of the workers.
- Younger workers changed jobs twice as often as older ones.
- Those with more schooling changed more often.
- Not surprisingly, unmarried workers moved more often to other cities.
- Two-thirds of all job changes were voluntary. The lure: better pay.
- Tool and diemakers cross industry lines freely but tend to stay in the same city and region. This indicates, BLS says, "acute staffing problems" for new plants outside metalworking centers. Such inducements as better pay seldom cause a tool and diemaker to move from one part of the country to another.

NLRB Rules T-H Violation by IAM

WASHINGTON — Long-standing feud between the International Association of Machinists and the United Brotherhood of Carpenters flared up again January 15 when the National Labor Relations Board ruled that a contractor and IAM violated Taft-Hartley by ousting union carpenters from a conveyor installation job at San Francisco Brewing Corp in 1951.

The contractor, Acme Equipment Co, installing a conveyor system at the brewery, knuckled under to a demand from IAM that it replace carpenters with IAM members. IAM, backed by a contract with the brewery, threatened to picket the job if its demands were not met.

This action, NLRB ruled, showed unfair job discrimination on the basis of union membership. Both the contractor, Acme Equipment Co, and the International Association of Machinists, must now make up any loss of pay suffered by United Brotherhood of Carpenters men who were fired from the installation job.

Plant Expansions

Service Machine Co, Elizabeth, NJ, recently completed a new tooling and production plant in Elizabeth. Claimed to be the largest general machine shop in the north Jersey area, the plant will devote 21,000 sq ft to engineering, tool and die manufacture, heavy machine manufacture, and machining.

Cincinnati Cleaning & Finishing Machinery Co, Ironton, Ohio, has started construction on a new plant at Sharonville, Ohio. The plant will house 15,000 sq ft of manufacturing, sales and engineering facilities.

Powdered Metal Products Corp of America is beginning construction of an addition to its Franklin Park, Ill, plant. The 6000 sq ft quonset addition will house furnaces for making powdered metal parts.

Edward Valves, Inc, East Chicago, Ind, has completed a modern, two-story building for its engineering department. The entire north wall is composed of plate glass windows and four-fifths of the building will be used as a drafting room.

A O Smith Corp, Milwaukee, is beginning construction of an electrode plant at Lancaster, Pa, scheduled for completion late in July. Two complete production lines, equipped with newest extrusion presses and furnaces, are features of the 41,000 sq ft plant.

Smith Welding Equipment Corp, Minneapolis, has added a 6000 sq ft wing to its plant, doubling the size of its engineering and experimental departments and providing additional facilities for quality control.

LOW-POWER TWO-WAY RADIO AT DOUGLAS AIRCRAFT speeds materials handling operations. Fork truck operator (left) a die-storage yard, located a half-mile from the main plant at El Segundo, Calif, receives radio instructions from dispatcher (right) to bring in a die for the drop-hammer department. Previously, a man had to be sent from the main plant to the storage area to transmit instructions to the fork truck operator

Business Items

US Pipe & Foundry Co plans to move its general offices from Burlington, NJ, to Birmingham, Ala. This means doubling the new office building of its subsidiary, **Sloss-Sheffield Steel Co,** and transfer of some 150 to 175 executive personnel. The move is being made because almost 90% of US Pipe's income is from the southeastern states.

Pacific Airmotive Corp, Burbank, Calif, has been licensed to take over manufacture of Rohr tilting arcs, used for handling of engines, assemblies and nacelles in the aircraft industry, and for handling of heavy crates, metal stacks, etc.

A O Smith Corp, Milwaukee, is moving its Products Service Div from Los Angeles to Oakland, Calif, where a 5-acre site has been purchased for construction of a 12,000 sq ft building.

Engelberg Huller Co, Inc, Syracuse, NY, has purchased **Rome Machinery Sales & Engineering Co,** and will operate it as the Rome Machinery Div of Engelberg Huller, moving operations for manufacture of Rome finishing and polishing machinery to Engelberg's Syracuse plant.

Emsco Manufacturing Co is the new name of **Emsco Derrick & Equipment Co.** Operations at the company's Los Angeles, Houston, and Garland, Texas, plants remain unchanged.

Production, Not Legislation, Will Lick Inflation, Says Berna

CLEVELAND—Basic answer to the inflation dilemma is not to be found in Washington but in stepped-up production by the nation's manufacturing plants, Tell Berna, general manager National Machine Tool Builders Association, told 800 at the annual banquet of the Plant Maintenance Show here Jan. 21.

"By concentrating the production of more goods," he said, "the ensuing competition will give us all more value for our money, and such competition will take care of the dollar." Berna also deprecated the need for vast new plants built with government aid.

Speaking on machine tools, Berna said a large number of obsolete machines now in operation should be replaced. A 10% increase in the productivity of the nearly 2-million machine tools in the United States would equal the industry's entire output in '53 and wouldn't cost a cent in new money, he added.

"I think such productivity increase is possible if labor and management work together," he concluded by saying ". . . the only reason anyone ever buys a new machine tool is to make more money."

Second speaker, George J Martin, National Biscuit Co, said industrial mechanization is proceeding so fast the average machinery investment per worker has risen from $2000 in 1900 to $8000 in 1950, and power consumption per industrial worker has risen accordingly.

Walker-Turner Holds Open House

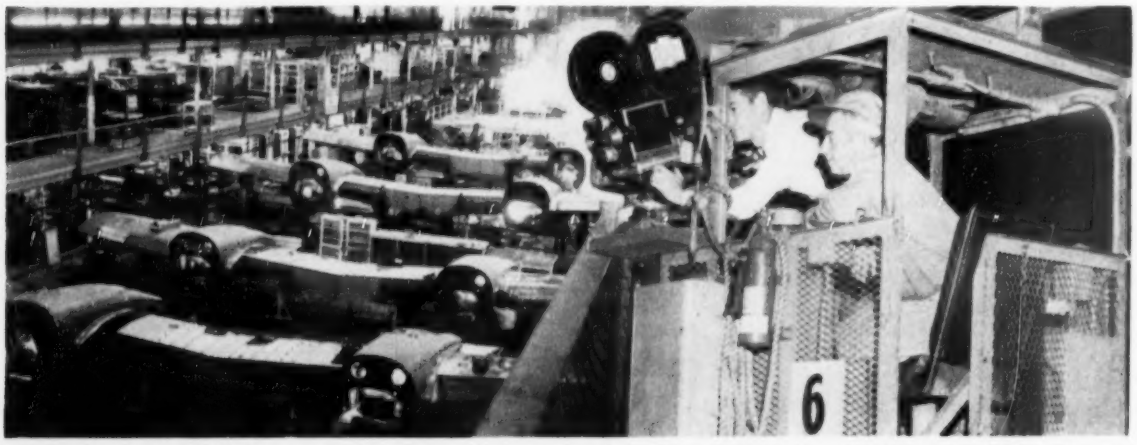
PLAINFIELD, NJ—Improved manufacturing facilities at Kearney & Trecker Corp's Walker-Turner Div were shown to the press and community leaders here for the first time at an Open House, Jan 16.

Next day, families and friends of employees were conducted on a tour through the plant and shown the company's full line of machine tools for metalworking and woodworking.

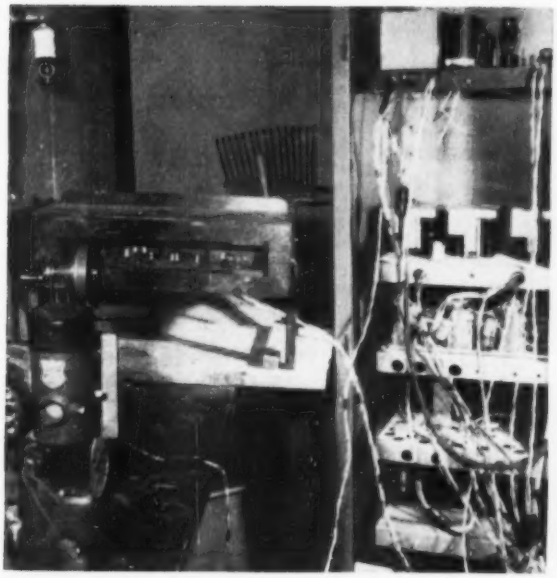
Visitors were shown the recently-completed building addition that makes possible the consolidation of all Walker-Turner activities in one plant. Formerly, a number of operations were performed in a plant some distance from the main building.

Carra L Lane, vice president and general manager, pointed out that this consolidation, together with a general re-arrangement and improvement of facilities, permits more efficient operation and results in a safer, more attractive plant.

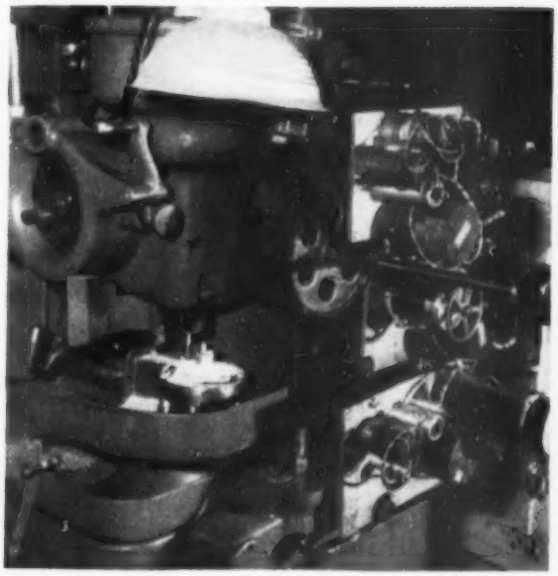
Civic leaders, including Plainfield's Mayor and Chamber of Commerce president, lauded the company for its active part in community life and its support of area projects.



SHOOTING THE WORKS from a moving crane keeps a movie camera crew busy at Convair's San Diego Div. Film shots of plant operations are taken from several angles to point out weaknesses in production setup. Later, films are run off on reversible projector for analysis and discussion by executives and production specialists



PROJECTOR throws spots of light from film on photo-tubes. Housing contains (from top) power supply, servo amplifiers, ratchet devices, transformers, voltage regulators



TWO identical gears are cut at once with servo-motors controlling the three machine variables: cutter rotation, work rotation, and center-to-center distance of work and cutter

Film Runs Non-Circular-Gear Shaper

BY ANDERSON ASHBURN
ASSOCIATE EDITOR

STAMFORD, Conn—A development in tape control for machine tools that has two important aspects for the future of automation has been announced here by Dr Fred W Cunningham, resident consultant of Arma Corp, Brooklyn. Involved is a control operated by 16-mm motion picture film for a No. 72 Fellows gear shaper that will automatically cut non-circular gears from data supplied to photo-electric cells. The two important aspects:

1. Accurate non-circular gears can be produced faster and more cheaply than by previous means. The use of such gears in computing mechanisms can thus be increased.

2. The control, made entirely of standard electronic parts (many of them obsolete models), points the way to the control of any standard machine tool for production of a group of similar parts.

Non-Circular Gears

The non-circular gear has been an intellectual curiosity for years, but has been rarely used because of the difficulty of producing it. The usual method is to produce a master gear by tool-making methods, a job requiring several months. This master is then reproduced on a gear shaper with a copying attachment. Another method was described in AM—Oct 29, '51, p95. Advantage of the gear over a cam is that it is more accurate and can transmit power.

WITH depth gage, Dr. Cunningham checks coordinates of pins clamped in teeth of finished gear

The T-41 Rangefinder for Army tanks employs pairs of non-circular gears that were being produced at Arma by this method. The difficulty of meeting production requirements led to the present development .

Several years ago Arma had developed a lathe that was controlled by perforated tape. On this machine, development of which was suspended at the start of the Korean War, the punched holes dictated the position to be taken by the tool and the speed of movement to that position.

How It Works

Dr Cunningham, starting from his work on the lathe, adapted the idea to present a continuous stream of data that would dictate the immediate movement of machine elements, rather than their final position. Magnetic wire or tape, punched cards, or film could present the data. Film was selected as being most economical.

Three machine motions must be controlled: rotation of the cutter, center-to-center distance of cutter

and work, and rotation of work. (Reciprocation of the cutter and backoff of the table do not have to vary in the course of a job.)

Standard electronic devices such as servo-amplifiers, stepping switches, transformers, voltage regulators, and synchros were assembled to control each of these motions so that one electrical impulse in the first circuit will cause the cutter to rotate 0.01 of one tooth, one impulse in the second circuit will reduce center-to-center distance by 0.00025 in., and one impulse in the third circuit will rotate the worktable by 2 min. of arc.

Thus far no gears have been cut that require an increasing center-to center distance. When this is necessary, a circuit can be included to provide reversing action.

To produce a non-circular gear, the first step is to calculate the order of these impulses for every point on the gear. For an average job, this requires about 100 hr. Because there are seven possible combinations of three impulses, this data comes out as columns of figures from 1 to 7. This is recorded on motion-picture film on a mechanism built by Dr Cunningham. As one of seven buttons is pressed the right combination of lights flash on a panel. Time delay switches hold the lights for proper exposure then advance the film to the next position (1/3 frame). Data for a gear can be filmed in 3 or 4 hr with this mechanism.

The developed positive of this film is projected by a machine from which the intermittent motion has been removed, and a gear drive added to provide a film speed of about 5 fpm. Projected spots fall on the ends of phototubes which originate the electrical impulses that control the machine.

The impulses are amplified and fed to stepping switches in which relays actuate ratchet mechanisms that rotate synchro-transmitters. Impulses go from these to the synchro-motors on the machine that move the machine controls.

A fourth light position is provided that shuts off the machine when the gear is completed. Production averages about 3 gears per hour.

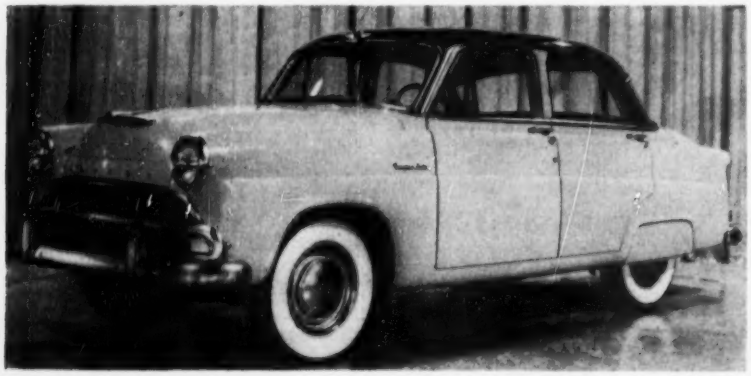
Future Applications

The fact that this control was built entirely from standard electronic components, such as those used in automatic fire-control equipment, combined with the recent trend in the standardization of these components, opens the possibility of building a control of this type for almost any machine tool. While not cheap, the standardization is making these components much cheaper than they were.

The tape control of machine tools, Dr Cunningham feels, will not replace present automatic machines in mass production. Electronic devices are always more susceptible to error than mechanical ones and will not replace cams on automatic lathes or screw machines, when production is high enough to warrant setup.

But for complex parts which must be made in small quantity, this method has great promise. A computing instrument can greatly reduce the time spent in calculation.

If electronic control of this type becomes general, it is possible to visualize telegraphic transmission of data in an emergency to produce a replacement part at the spot required from data at the plant that made the original.



HUDSON'S NEW "JET" LINE marks the company's entry into the low-price field. The Jet factory lists at $1685, while the slightly more luxurious Super Jet (shown here), lists at $1775. Both feature low gravity center, in-line L-head engine with 7.5 to 1 compression ratio

Samuel Sloan Auchincloss

Samuel Sloan Auchincloss has been elected president of DeWalt Inc, subsidiary of American Machine & Foundry Co. Executive vice president since August, 1952, Mr Auchincloss succeeds **Paul Gardner,** who resigned at the end of the year. Prior to his appointment, he served as director of operations of AMF's Colorado Springs plant.

Kenneth R Brock, former general manager of McGuire Pontiac, has been named vice president of the OK Stamping Corp's newly-acquired plant in Toledo, Ohio. In addition, Mr Brock has been appointed assistant general manager of the Nash Mfg Co, Toledo, where he will act as administrative assistant to the president.

Arthur W Kurz, Jr, formerly chief engineer of Dolphyn Engineering Corp, has been named vice president in charge of engineering at Hunt Loom & Machine Works, Inc. His appointment was erroneously reported in our Dec 22 issue.

Theodore V Purvin has been appointed general sales manager of Amgears, Inc. Mr Purvin has been associated with the gear and related industries for the past sixteen years.

Dan A Ringis has been appointed plant manager of the Chrysler Motors Los Angeles plant. He succeeds **C C Rowles,** assigned special duties on the staff of **F L DeCavitte,** operating manager of the entire Plymouth division.

B N Clarke has been appointed sales engineer, not sales manager, as erroneously reported in our Jan 5 issue, in the New England territory for Surface Combustion Corp. He will work with **W T Fulton,** district manager for the area.

John S Liefeld

James W Wells

Henry F McKenney

Carl J Demrick

Names in the News

John S Liefeld has been appointed factory manager of Marquardt Aircraft Co. Prior to joining the organization, Mr Liefeld was associated with Aircraft Metal Forming Co, and also served as an officer and director of Keller Motors Corp of Alabama.

James W Wells has been elected vice president of Giebel, Inc, New York. He was formerly associated with the Curtiss Wright Corp as general supt of the Beaver, Pa, Propellor Div.

Dr Philip R Marvin has been elected vice president of the Commonwealth Engineering Co of Ohio. Dr Marvin will supervise contract negotiations, in addition to heading the Industrial Dept. During the war he served as director of chemical and metallurgical engineering for the Marine Div of Bendix Aviation Corp. Prior to his present appointment, Dr Marvin was senior management consultant at Booz, Allen & Hamilton in Chicago.

J C Kuhn has been named vice president, sales, of the Atkins Saw Div of Borg-Warner Corp. Prior to his appointment he served as vice president and director of sales of Morse Twist Drill & Machine Co.

William H Bennett has been named director of engineering, Hydraulic Press Manufacturing Co. Prior to his appointment he served as assistant sales manager of the company, and was chief of Forge and Press Equipment Section, Metalworking Equipment Div, National Production Authority.

Henry F McKenney has been named chief engineer of the Ford Instrument Co, Div, Sperry Corp. A member of the organization for the past eleven years, Mr McKenney has been serving as assistant chief engineer since 1950.

Harold D Newell has been appointed consulting metallurgist, and **John J B Rutherford** chief metallurgist of the Tubular Products Div of Babcock & Wilcox Co.

Robert Brady of Wheeler-Brady, Inc, consulting engineers, has resigned. At the same time it was announced that the name of the firm would now be Wheeler Associates, Inc. **William S Wheeler,** president, has also announced plans for adding at least six more engineers to the firm in an expansion program.

Carl J Demrick has been named staff master mechanic of Chrysler Corp; he succeeds **M T O'Donnell,** appointed assistant general works manager of the Sales Div. Mr Demrick has been associated with the organization since 1934; for the past two years he has been serving as supervisor of the Central Estimating Dept.

Ralph W Seely has been named vice president and general manager of the Consolidated Western Steel Div of US Steel Corp. He formerly served as vice president and assistant to the president of the division. Mr Seely joined Consolidated in 1940; in 1944 he was transferred to the Los Angeles headquarters, and in 1948 was elected a vice president.

O M Marquardt has been named manufacturing manager of the Tocco Div, Ohio Crankshaft Co. A member of the firm since 1948, Mr Marquardt was formerly associated with the Budd Co, and General Electric in Detroit.

OBITUARIES

Edwin R Motch, 51, president of the Motch & Merryweather Machinery Co, Cleveland, and first vice president of the American Machine Tool Distributors' Association, died Jan 22. He had been head of Motch & Merryweather since 1946, when he succeeded his father, one of the founders of the company. He served in the Ordnance Department of the Army during World War II as a Colonel. At the time of his death, Mr Motch was director of the Central National Bank of Cleveland, Gould & Eberhardt, Inc, Avey Drilling Machine Co, Giddings & Lewis Machine Tool Co, American SIP Corp, and Baker Brothers, Inc.

John J Barth, 73, president of the Barth Stamping & Machine Works, Cleveland, died Jan 22. Mr Barth founded the company forty years ago.

Clarence Snyder, 72, chairman of the board of Snyder Tool & Engineering Co, and its subsidiary, Arthur Colton Co, Detroit and Mancelona, Mich, died Jan 4 in Florida. Mr Snyder, credited with development of the trunion-type fixture, organized his own company in 1923.

Frank M Mason, 42, vice president of US Electrical Motors, Inc, died Dec 27.

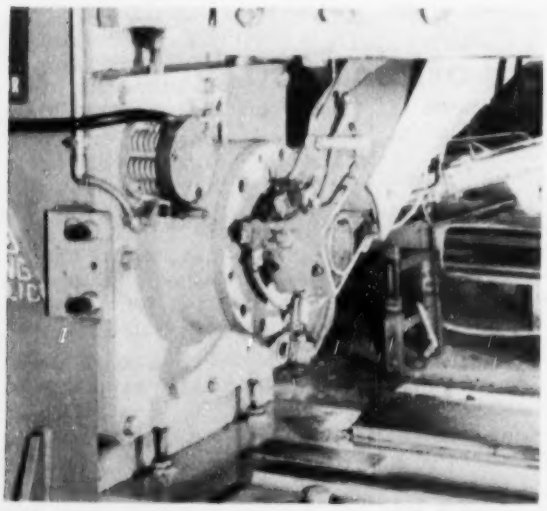
Charles H Currier, 66, chairman of the board of Kewanee-Ross Corp, died Dec 22 in Buffalo, NY. Mr Currier became chairman when Ross Heater & Mfg Co, of which he was president, was recently joined with Kewanee-Boiler Corp.

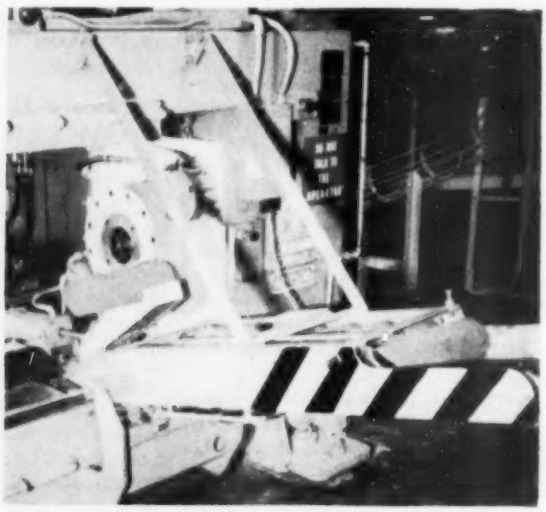
New Shop Equipment

DOUBLE-END OPERATION is the feature of this 330-ton hydraulic press. Over-all height is only 10 ft, length 26½ ft. Maximum daylight is 54 in., min. 18 in., stroke 36 in., beds and slides are 30 x 30 in.

Horizontal Double-End Hydraulic Press

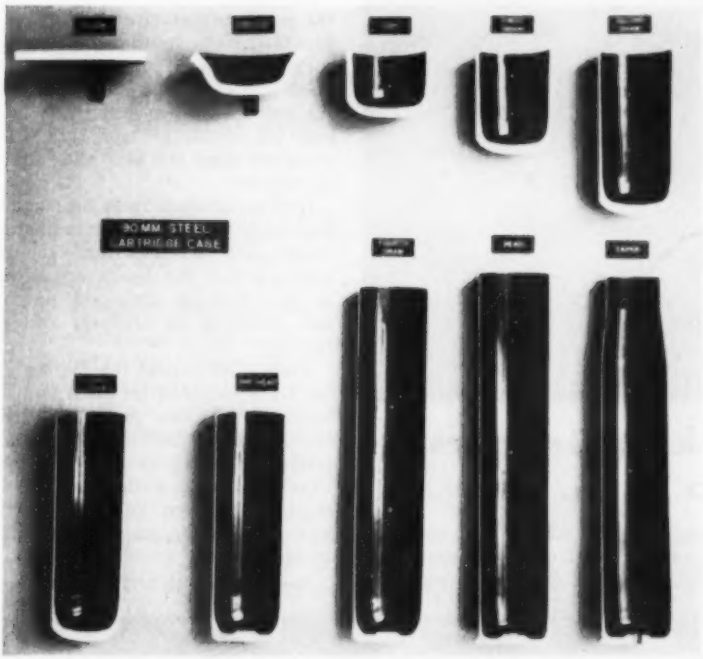
LOWER FIRST COST, compactness, reduced power requirements, low over-all height, no foundation pits, ready accessibility to dies and for maintenance, and ease of conveyorization were all factors in design of this new double-end horizontal press. It was worked out to suit conditions at the New Orleans plant of Rheem Mfg Co, where 90-mm steel cartridge cases are produced in Quonset-type buildings on unstable subsoil and





TWO TYPES of automatic chute feeds are pneumatically and electrically interlocked with press stroke. That at left is used in early operations, is permanently in position; that at right lifts in and out so the slide is cleared, permitting less over-all press length. Unit at left has limit switch that cuts out press until one part is aligned; others are held back in chute by pneumatic pawl. Unit at right has pneumatic pawls to lift part, also has pneumatic stop and electric interlock, is called "left in, drop out" type

Materials and Parts



DRAWING begins with an 0.69x8⅝-in. disk of 1030 steel. These presses handle cupping, four drawing and the tapering operations; verticals do pre-cupping, pre-heading, and heading

with a high sub-surface water table. Soil is capable of supporting only about 1/6 the usual maximum.

The press is of the housing type with fully shrunk tierods and has a variable capacity on each end from 0 to 330 tons. Closing and return speeds are 2200 ipm, pressing speed 200 ipm, attained by three 77-gpm pumps driven by 75-hp, 1200-rpm motors. Press weight is 70,000 lb.

These presses handle cupping and drawing operations. In final drawing of a shell 24 in. long, long press stroke is required, resulting in equally long return time. The double-end press permits production at both ends, thus eliminating lost motion on the return and necessitating only half the motor capacity of two separate presses, cutting first cost and power consumption.

The broad base reduces foundation loading, and concentration of equipment overhead avoids need for a pit. Die alignment is more difficult, but once attained, is constant because there is no play in the slide. Low silhouette reduces plant headroom, makes dies and operating mechanism readily accessible.

All operations are conveyorized, and controls are interlocked for automatic operation, so operators act primarily as observers.

Cupping on this press takes a precupped piece through a carbide-insert draw ring which reduces wall thickness 44% and requires 265 tons. On the opposite end, the first draw cuts wall thickness 45% again. For tapering, only 90 tons are required, and the case is loaded automatically against a base plate and held by the base flange. A 25-ton ejector, hydraulically actuated, is built into the slide, which also carries all tapering elements; the bed merely holds the workpiece.

Automatic feeds and conveyorization make the entire plant very compact—about half the floor area of earlier similar lines. Four of the double-end horizontals are in use, six ends handling the job and two available as spares.

Clearing Machine Corporation, 6499 West 65th St. Chicago 38, Ill.

... INCLUDING

Vertical chucking grinder line has been developed for convenient handling of large work. page 154

Tracing attachment for turret lathes combines facilities of turret and profiling lathes. page 154

Tool and cutter grinder, available in plain and universal models, has direct drive to work. page 156

Vertical turret lathe drives without bevel gears. page 158

Burners in rotary-hearth furnace fire against direction of table rotation. page 162

Sealed heat-treating unit provides absolute atmospheric control during entire cycle. page 164

Tramrail carrier, 3-ton capacity, weighs loads handled in pounds or kilograms. page 166

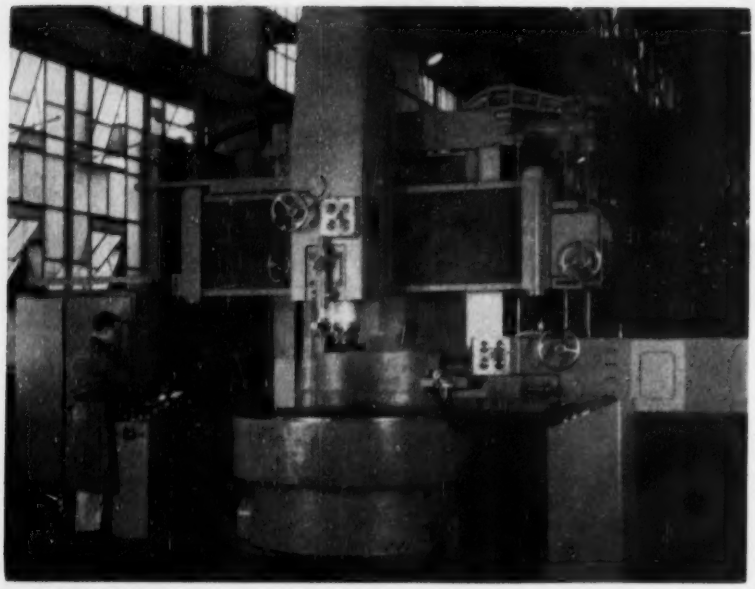
Bore depth control to 0.001 in. is recorded on attachable device page 168

Balancing unit corrects parts by milling. page 170

... and in Feb 16

Vertical boring mill is a dual-purpose machine that can work as a conventional machine or as a contour mill.

Gear shaving attachment makes possible conventional or diagonal shaving in the same machine.



Bullard Vertical Chucking Grinders Introduced in Sizes to 74 In.

A line of vertical chucking grinder machines has been announced by The Bullard Co. Designed for grinding large work conveniently, the line includes six sizes: 30, 36, 42, 54, 64, and 74 in. The first machine produced is now in production at the Timken Roller Bearing Co plant in Canton, Ohio.

A variable speed drive provides infinitely variable table speeds from creeping speeds to the top speed specified by the customer. Reversing controls permit the grinding spindles to run in either direction. Speeds of the grinding spindles are also determined by particular requirements with maximum horsepower of 10 in the main head and 5 in the side head.

Grinding heads have hydraulic drive for smooth reciprocating action. Rate of reciprocation is controlled by a selector dial with twelve valves of orifice type for metering the flow of oil. Thus the operator can select any of twelve pre-determined speeds that are built into the machine.

A fine feed and an adjustable dwell are provided for grinding up to shoulders in combination with any of the reciprocating speeds. They can be used together or independently at the bottom, top, or both ends of the stroke. Adjustable cams control the length of stroke with positive stops.

The main head can be swiveled 30° to the right or left of center and the side head swivels 20° above or below the horizontal position.

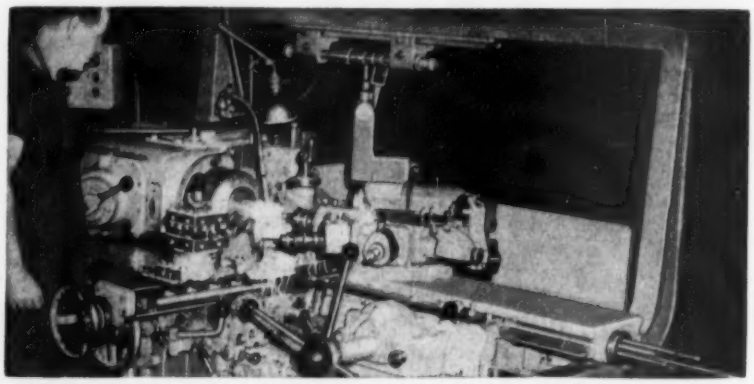
Dual control desks with pushbutton controls are located one on each side of the machine. They are interlocked so that only one can be used at any time. Wheel dressers, hydraulically operated, with adjustable reciprocating speeds are mounted on each head.

Grinding wheels are mounted on the motor armature shaft for rigidity. Grinding spindle housing incorporates the motor field. Hardened and ground square lock ways for both heads are within the housings for protection. Spindles can be removed from the lock slide for replacement.

Non-metallic surfaces bear against the hardened way with adjustable taper gibs for rigidity. Grinding slides within the heads are always in full bearing. Exposed bearings are protected by scrapers and grit shields.

Trabon automatic lubricating systems are included on main and side heads. Interlocks prevent starting the machine unless the work is properly held by the magnetic chuck. Lockout switches make the machine inoperative while setting switch cams for length of grinding strokes.

The Bullard Co, Bridgeport 2, Conn



Jones & Lamson Tracing Attachment Fits Ram or 7A Saddle Machines

A hydraulic tracing attachment for turret lathes has been developed by Jones & Lamson for use on any J&L ram or 7A saddle universal bar or chucking machine. Powered by a differential type of cylinder, the attachment is for general tracing, multi-step shaft, and contour work.

The tool-carrying slide is mounted at a 45° angle with the spindle axis. The cylinder stylus and cutting tool are mounted on the back of cross slide on a carriage of bridge type. This arrangement frees the square turret for other operations.

For taper turning, a hardened straight edge, set at the desired angle, serves as a templet. In addition to tracing and taper turning, this attachment, in effect makes available the facilities of a turret lathe on a profiling lathe. Thus, fast "hogging" of stock, threading, or any other turret lathe operation can be accomplished without removing the work.

The tracing mechanism can be disengaged by turning a switch.

Jones & Lamson Machine Co, 502 Clinton St, Springfield, Vt

Alemite "Friction Fighters"

save $2000 a year for steel company!

...add 30 minutes' operating time daily, end bearing failures and lubricating hazards

A mammoth traveling crane carrying tons of steel making constant stops and quick returns. Here—friction's wear and tear posed a costly problem in bearing replacement. Shutdowns were frequent. Delays cut into operating time.

To end this problem once and for all—plant engineers called in an Alemite "Friction-Fighting" specialist. Specific requirements were discussed in detail. Past difficulties were reviewed. Recommendations were made, and an Alemite Mechanized Lubrication System was installed.

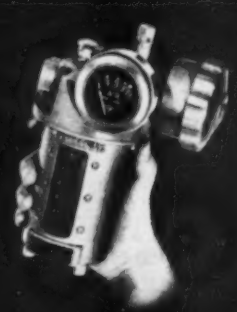
This action brought immediate four-way savings: Eliminating lubrication down-time added 30 minutes daily productive use of the crane—time worth $9 a day, $2000 per year. 60% less grease was used. Expensive bearing replacements were eliminated. Also, the 60 foot climb to lubricate out-of-the-way bearings in dangerous locations was eliminated.

Conquering friction is Alemite's business—cutting costs, decreasing down-time, increasing profits. An Alemite Lubrication Engineer can show you ways of making savings. Contact your local Alemite Distributor now.

Alemite—the great name in lubrication serves the great names in industry

Wherever metal touches metal, wherever you find machinery in motion, you're most likely to find Alemite Lubrication and Lubrication Systems on the job. Here are but a few of the industrial leaders who use Alemite.

Eastman Kodak Company • Procter & Gamble
Boeing Airplane Company • Swift & Company
International Harvester Company



Alemite "Oil-Mist" Lubrication—another amazing "Friction-Fighting" Development

This most efficient, continuous, fully automatic system in all the field of machinery lubrication atomizes oil into mist—distributes it through tubing to bearings—bathes *all* bearing surfaces with a fresh, clean, cool oil film. Cost of machinery lubrication is cut materially. Human element eliminated.

A PRODUCT OF SW STEWART-WARNER

ALEMITE

35 Years of Lubrication Progress

Please send me **FREE** *New Booklet*

☐ "11 Ways to Cut Production Costs."

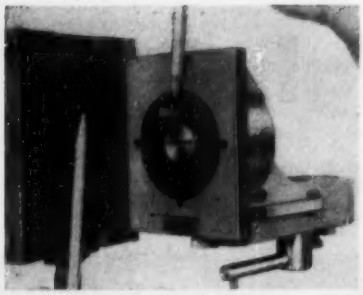
☐ Include Facts on "Oil-Mist"—the amazing new system that atomizes oil, circulates it to bearings under pressure.

ALEMITE, Dept. C-23
1850 Diversey Parkway, Chicago 14, Ill.

Name .....

Company .....

City ..... State .....



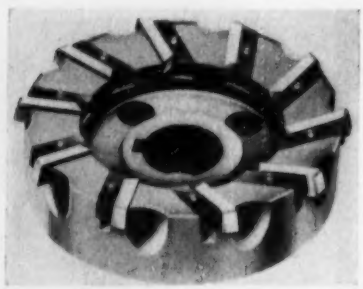
Dual-Purpose Wheel Dresser

Model REC has been added to the Fluidmotion line of dressers, a line designed to dress 2 angles tangent to a radius in one continuous motion without use of dovetails.

Angles are dressed by continuing to push the handle in either or both directions after radius is formed. Diamond automatically returns to center positions after dressing the angles.

REC, when snapped out of its micrometer base, is ready with the proper fixtures for cylindrical grinding to 0.0001 in. accuracy. Replaced in the base, it surface grinds to the same accuracy. Can also be used for under-the-wheel dressing.

J & S Tool Co, 644 W Mt Pleasant Ave, Livingston, NJ



Face Milling Cutter Has Heavy, Interchangeable Carbide Blades

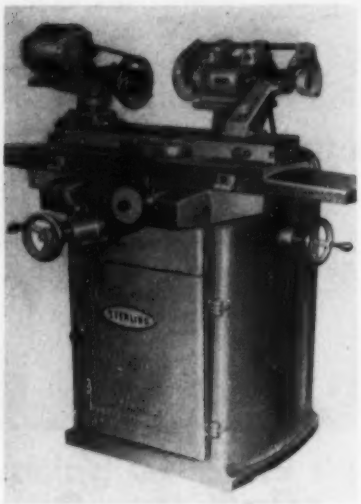
The Super IBH is a solid carbide inserted blade face milling cutter, which can also be used as a half side mill.

Blade, wedge, and screw are the only parts to be assembled with the steel body; recess below each wedge facilitates quick, easy removal. Threads are in the wedges, rather than in the body; any damage is absorbed by blades and wedges, and body can be refitted to resume work quickly.

Solid carbide blades are extra heavy, and arranged radially for max life. All parts are interchangeable; blades can be reversed and used in either right or left hand bodies.

Unit is available in six standard sizes: 4, 6, 8, 10, 12, and 14 in. in both right and left hand, also in specials.

Super Tool Co, 21650 Hoover Rd, Detroit 13, Mich



New Tool and Cutter Grinder

New universal tool and cutter grinder, known as Sterling Model G, has been added to the McDonough line.

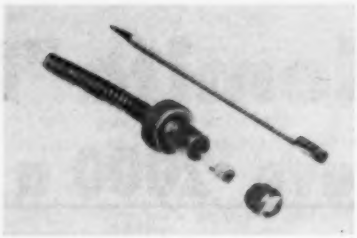
Direct drive wheel head, which uses Excello spindles, rotates a full 360°; worktable swivels 180°. Swing over table is 10¾ in., and max distance between centers with LH and RH tailstock is 27 in. Workhead with No. 12 B&S taper and No. 50 milling machine taper is standard equipment. Machine can be operated from front, left or right hand sides.

Plain unit will handle most of the tool and cutter grinding in a shop. Universal machine includes all standard fixtures, i.e., motor-driven workhead, internal grinding attachment, etc., in addition to power table traverse and automatic table infeed.

McDonough Manufacturing Co, Eau Claire, Wis

Magnifier black light unit for fluorescent penetrant inspection on metals, castings, parts, etc, weighs 30 oz, measures 7x5x2 in. Twin tubes produce ultra violet energy directed upon inspected surface; there is no back glare or heat to affect operator's perception. White fluorescent tubes may be used in the unit for high detail inspections. Hand-held and stand models available.

Burton Mfg Co, 11201 West Pico Blvd, Los Angeles 64, Calif



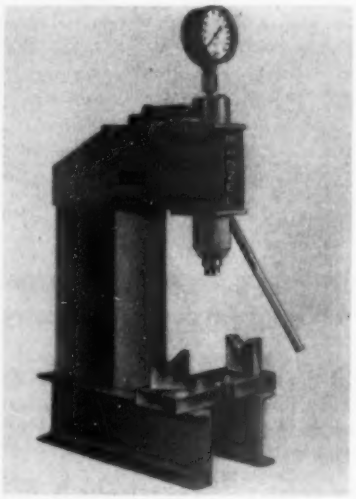
Cell Registers Flame Failure

The Firetron provides flame safeguard for manually ignited burners and complete programming and safeguard for automatic burners.

Unit is a photo-conductive cell highly responsive to infrared of any flame, regardless of fuel used. It replaces both flame rod and photocell flame detectors; with its associated electronic circuits, it distinguishes between fire and any other source of infrared, giving instantaneous and positive response to flame failure.

Cell is plugged into the scanner unit 48PT1; single scanner sights through a piece of standard ½-in. pipe, where it can view both the pilot and main flames.

Combustion Control Corp, 720 Beacon St, Boston 15, Mass

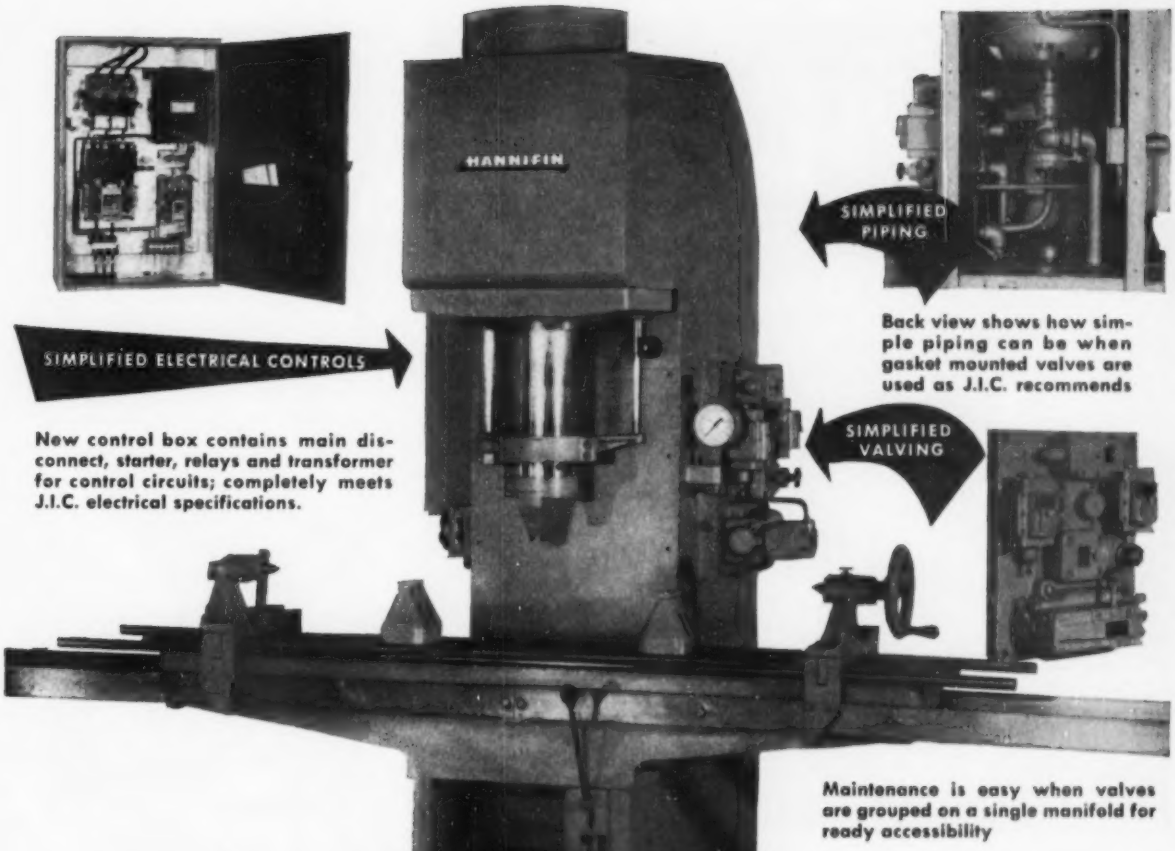


10-ton Arbor Press

This 10-ton bench type arbor press has a wide range of uses in toolroom, laboratory, or machinery overhaul department for straightening, material testing, bending, bushing, or bearing removal and replacement operations.

Gage registering in tonnage is available as optional equipment. V blocks and bearing plate are furnished as shown.

Manzel, 315 Babcock St, Buffalo 10, NY



New control box contains main disconnect, starter, relays and transformer for control circuits; completely meets J.I.C. electrical specifications.

Back view shows how simple piping can be when gasket mounted valves are used as J.I.C. recommends

Maintenance is easy when valves are grouped on a single manifold for ready accessibility

HERE'S A HANNIFIN HYDRAULIC PRESS

. . . built to J. I. C. Standards for maximum performance, minimum maintenance

•You asked for this new straightening press. Hannifin designed and built it exactly to J.I.C. (Joint Industrial Conference) standards. Basically, this is Hannifin's standard 75-ton press with valving, piping and electrical controls positioned for maximum accessibility. This makes a safer, easier press to maintain.

Of course you can still select the press you need directly from the Hannifin catalog. However, if you want your press built to J.I.C. standards—or if your requirements are otherwise special—a Hannifin Field Engineer can demonstrate how easily a standard model can be modified to exactly suit you.

The Hannifin line is really complete with hydraulic presses for straightening, press-fit assembly, forming, molding, riveting, clinching, punching, staking and marking. There are more than 75 standard models from which to choose—capacities to 150 tons. Hannifin Corporation, 1117 S. Kilbourn Ave., Chicago 24, Illinois.

WRITE FOR BULLETIN 130

HANNIFIN CORPORATION
1117 S. Kilbourn Ave., Chicago 24, Illinois
Please send me Bulletin 130 on Hannifin Hydraulic Presses.

Name.....
Position.....
Company.....
Address.....
City.....*State*.....

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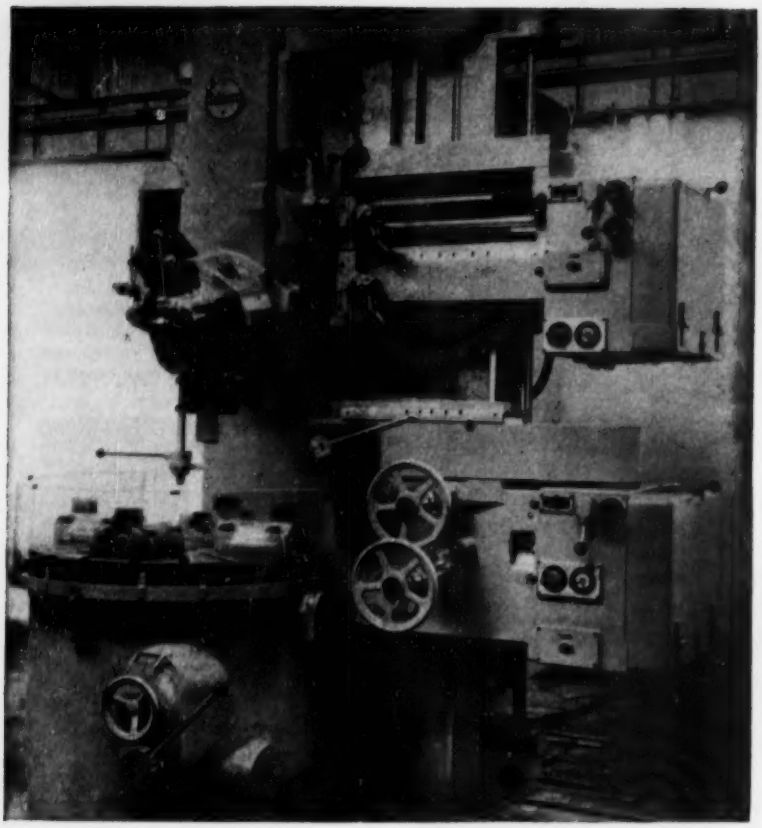


Schiess Vertical Turret Lathe Drives Without Bevel Gears

Schiess single-column vertical turret lathes for high-speed machining with carbide tools are available in turning lengths of 39, 49, and 65 in. The KE series has an all-vertical gear drive.

Main motor mounted in a vertical position on the back of the machine is directly connected to the gear box through a vibration-absorbing coupling. The gear box is also mounted vertically so that changes in direction of the drive are transmitted to the table without bevel gears. This is claimed to eliminate vibration and play.

Separate column and table base construction permits fine adjustment and close table tolerances against the column ways for both the cross rail and vertical ram. A single lever unlocks, raises or lowers, and locks cross rail by electro-mechanical controls.

Hydraulic pre-selection of speeds can be made while table is rotating with 16 spindle speeds in a ratio of 1:50 provided. Maximum table speed for KE 100 model is 310 rpm.

A copying attachment with electric tracer can be supplied for use on either the cross rail and vertical ram or on the side head. Three threads in rations of 1:4:16 can be cut without changing gears. With a gear change of 2:1, threads from 1⅜ to 30 per in. can be cut. The standard 2¾-in. bore takes conventional cutting tools.

Imported by:

Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY

Snap gages, used as a quick method of close tolerance checking where rigid standards are maintained, are adjustable to limits. The operator can tell by the go and no-go parts whether item being produced is in accordance with correct limits. Outer anvils or gaging buttons are set to max size allowed by blueprints, and inner anvils to the minimum size. By passing work through outer anvils, oversize can be determined. Available in a variety of sizes and ranges.

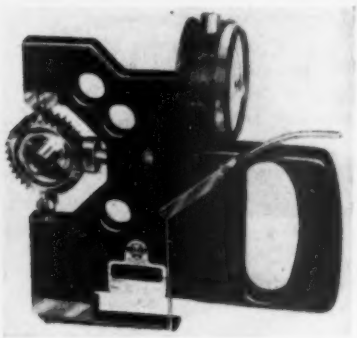
HVH Tool & Instrument Co, 150 Lafayette St, New York, NY.

Bearing Lubricant

Molykote M-55 is a colloidal dispersion of powder suspended in a synthetic vehicle compatible with any petroleum or sulfur-base cutting or lubricating oil.

It has been developed for use as an extreme bearing pressure additive to conventional oils in force-feed lubrication systems of machinery and as an additive to cutting and coolant oils whenever the frictional component is a substantial part of the total cutting force, such as thread-rolling, high-speed forming operations, etc.

The Alpha Corp, 179 Hamilton Ave, Greenwich, Conn



Dial Gage Has Removable, Interchangeable Parts

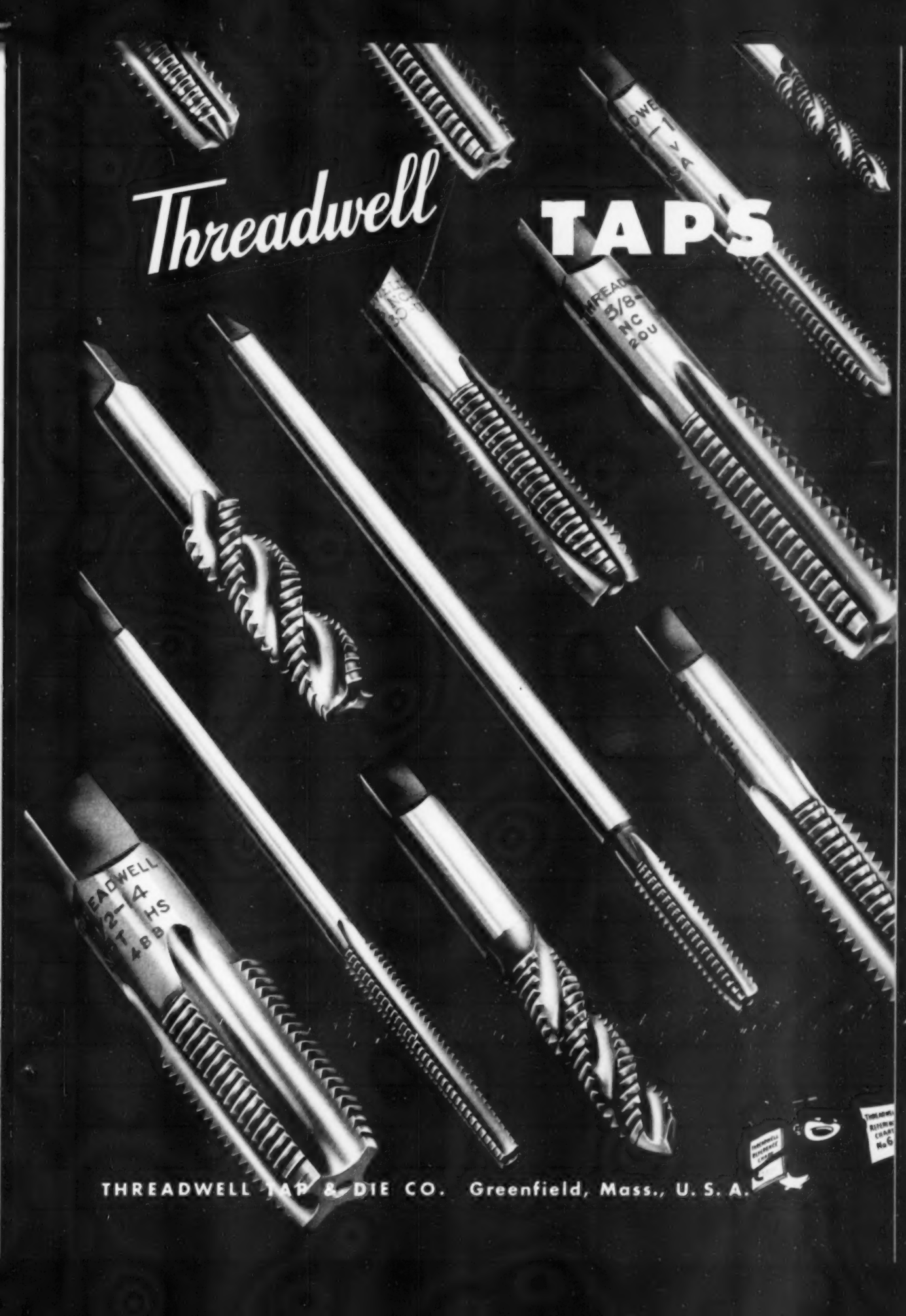
Nilco dial gage is designed to check pitch dias of gears and splines, or any other over-roll measurement. Floating rolls are attached to the gage to allow free-floating of both anvils, resulting in true pitch dia reading.

Interchangeable anvils can be removed to check wear, or for replacement by larger or smaller rolls. Retracting lever collapses the gaging roll and allows gage to clear the OD of the gear or spline; when lever is released, gage automatically aligns rolls over the teeth of the gear or spline. Unit is equipped with a 0.0001-in. indicator and can be used on production or inspection.

Nilsson Gage Co, Poughkeepsie, NY

Fast-drying ink is available for permanent marking of rough castings, bar stock, machinery jigs, tools, dies, fixtures, and plates. Said to be chip- and peel-proof, and unaffected by heat and weathering. It is applied from a burst-proof tube with a ball point attachment specially designed for marking rough materials. Different sizes of points are available, and ink can be obtained in six colors.

John P Nissen, Jr, Co, Glenside, Pa.


Threadwell
TAPS
THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

Tap Recommendations for Various Classes of Fit

FOR MACHINE SCREW SIZES

MACHINE SCREW SIZES	THREADS PER INCH			CLASS OF FIT			
	N. C.	N. F.	N. S.	1	2	3	4
0		80		PG1	PG1	PG1	
1	64			PG1	PG1	PG1	
		72		PG1	PG1	PG1	
2	56			PG1	PG1	PG1	
		64		PG1	PG1	PG1	
3	48			Cut	CG	PG1	
		56		Cut	CG	PG1	
4			36	Cut	CG	PG1	
	40			Cut	CG	PG1	
		48		Cut	CG	PG1	
5	40			Cut	CG	PG1	
		44		Cut	CG	PG1	
6	32			Cut	CG	PG1	
		40		Cut	CG	PG1	
8	32			Cut	CG	PG1	
		36		Cut	CG	PG1	
10	24			Cut	CG	PG1	
		32		Cut	CG	PG1	
12	24			Cut	CG	PG1	
		28		Cut	CG	PG1	
14			20	Cut	CG	PG2	
			24	CG	CG	PG1	

FOR FRACTIONAL SIZES

FRACTIONAL SIZES	THREADS PER INCH			CLASS OF FIT			
	N. C.	N. F.	N. S.	1	2	3	4
¼	20			Cut	CG	PG2	PG01
		28		CG	CG	PG1	PG01
5/16	18			Cut	CG	PG2	PG01
		24		CG	CG	PG1	PG01
⅜	16			Cut	CG	CG	PG01
		24		CG	CG	PG1	PG01
7/16	14			Cut	CG	CG	PG01
		20		CG	CG	PG2	PG01
½	13			Cut	CG	CG	PG01
		20		CG	CG	PG2	PG01
9/16	12			Cut	CG	CG	PG1
		18		CG	CG	PG2	PG1
⅝	11			Cut	CG	CG	PG1
		18		CG	CG	PG2	PG1
¾	10			Cut	CG	CG	PG1
		16		CG	CG	PG2	PG1
⅞	9			Cut	CG	CG	PG1
		14		CG	CG	PG2	PG1
1	8			Cut	CG	CG	PG1
		14		CG	CG	PG2	PG1
1⅛	7			CG	CG	CG	
		12		CG	CG	CG	
1¼	7			CG	CG	CG	
		12		CG	CG	CG	
1⅜	6			CG	CG	CG	
		12		CG	CG	CG	
1½	6			CG	CG	CG	
		12		CG	CG	CG	

Class 1—Loose Fit

—for threaded parts calling for quick assembly and permitting a generous amount of shake or play.

Class 2—Free Fit

—for threaded parts that may be assembled entirely or almost entirely with the fingers and permitting a slight amount of shake or play.

Class 3—Medium Fit

—for threaded parts which are to be assembled with the fingers entirely or almost entirely and having the minimum shake or play between members.

Class 4—Close Fit

—for threaded parts requiring the most exacting precision fit and calling for a screw driver or wrench for assembly.

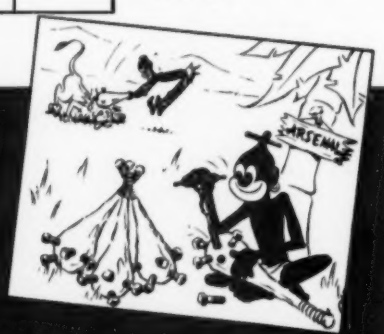
CUT Cut thread taps, either carbon or high speed.

CG Commercial Ground Thread Taps (High Speed).

PG2 Precision Ground Thread Taps (High Speed) with Pitch Diameter 2 Limit—Basic plus .0005" to basic plus .0010".

PG1 Precision Ground Thread Taps (High Speed) with Pitch Diameter 1 Limit—Basic to basic plus .0005".

PGO1 Precision Ground Thread Taps (High Speed) with Pitch Diameter 01 Limit—Basic to basic minus .0005".



Threadwell

Threadwell Tools do many jobs

they can do your tough ones

THREADWELL TAP & DIE CO. Greenfield, Mass., U. S. A.

NEW! JOHNSON'S #130 WAX-COOL

A WATER-TYPE WAX COOLANT

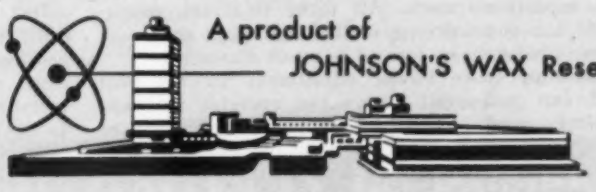
Now, for the first time, Johnson's new *Wax-Cool* brings to machines requiring a water-soluble coolant all the benefits resulting from the *greater lubricity inherent in wax.*

For more than two years, Johnson has worked on a water-type wax cutting fluid—and today it is a reality. *Johnson's Wax-Cool* offers you the same production and tool saving advantages in a coolant that *Wax-Cut* has become known for in an oil type. Great cooling power—longer runs between tool sharpenings—a marked improvement in finish—freedom from smoking and fumes—these are the benefits wax provides.

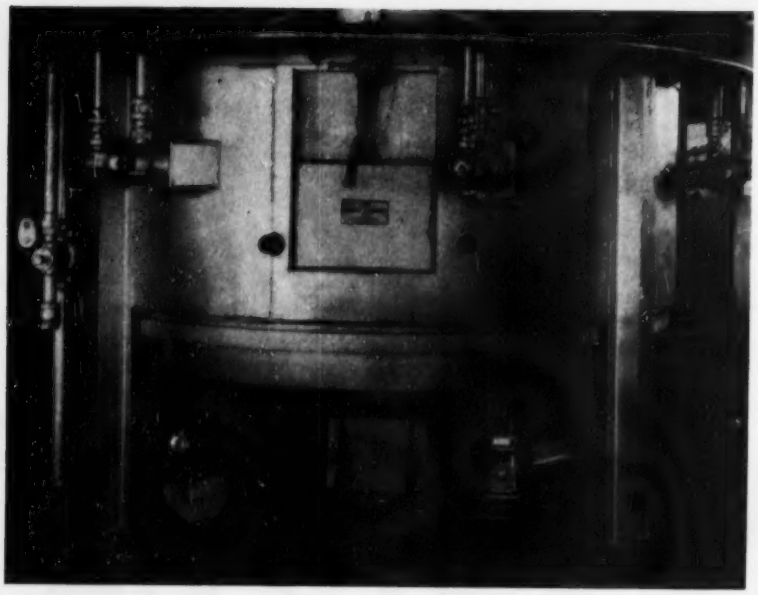
Don't believe us. We know our claims sound like all the rest. But this time—just once—take the steps to make a thorough check of *Johnson's Wax-Cool* and *Wax-Cut,* too, in your own equipment. You're in for a surprise.

For all the facts on these revolutionary wax cutting fluids get in touch with your local Johnson distributor, or write now to

Industrial Products Dept. AM2
S. C. Johnson & Son, Inc., Racine, Wisconsin



A product of
JOHNSON'S WAX Research



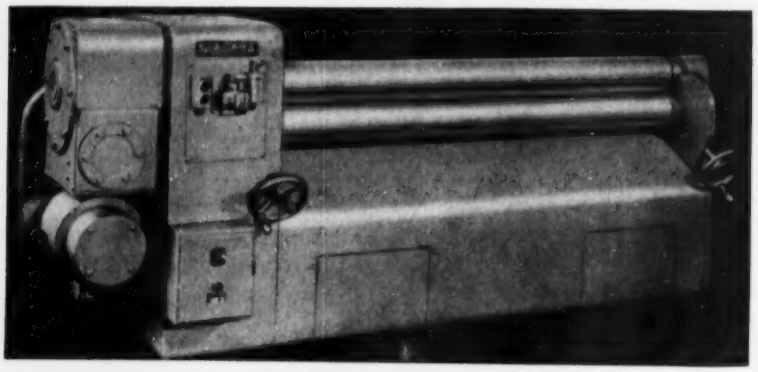
Waltz Rotary Hearth Furnace Has Long Flame Burners

Burners fire tangentially of the inner lining and against the direction of rotation of the table in this rotary hearth furnace. The hearth is 7½ ft outside diameter with a 30-in. column. Chamber height is 15 in.

Drive mechanism and blower are mounted on the base of the furnace, making a self-contained unit. Top is removable in one piece. Control is by a Leeds and Northrop strip chart controlling instrument.

Temperature range is 1200 to 2300 F for continuous operation in forging or heat-treating. Other sizes 3 to 10 ft diameter, heated with gas, oil, or electricity.

Waltz Furnace Co, Dept A, 1901 Symmes St, Cincinnati, Ohio



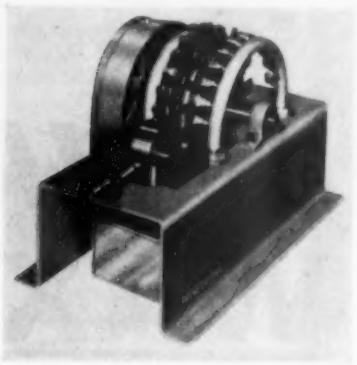
Niagara Steel Bending Rolls Produce Cylinders and Special Shapes

A series of all-steel bending rolls in three sizes has capacities from 5/16x48 in., 3/16x72 in., and 12 gage x 120 in. They produce commercially true cylinders up to maximum capacity and can roll various shapes, including oval forms, rectangular pipes, rounded end containers, and cones.

The pinch type of construction is said to reduce flat spots on the leading and trailing edges of the work. All three rolls are power-driven so that light-gage sheet can be formed to small diameters.

Power adjustment for the rear roll allows the operator to make quick adjustment for the desired curvature. Main motor magnetic brake prevents drifting of the work.

Niagara Machine and Tool Works, 637-697 Northland Ave, Buffalo 11, NY



Unit Determines Resistance of Materials to Heat Checking

Thermo-Test is a device to determine relative resistance of different materials to heat checking. Test pieces are successively heated, stressed, and cooled; cycle is repeated until specimen develops visible cracks or heat checks.

Number of cycles required to produce heat checks is indicated on a counter attached to the machine; as many as 18 pieces can be tested at one time. Effects of various treatments, range of heating and cooling, amount of pressure applied to the specimen, and effects of various alloying elements on resistance to checking can be studied. Various materials used for molds, die casting dies, hot piercing mandrels, hot rolls, etc, can be tested.

Unit measures approximately 24 in. wide, 36 in. long, 18 in. high.

Henry G Keshian, Hotchkiss Grove, Branford, Conn

Portable electronic stethoscope, called Elec-Detec, has been developed to locate friction noises in bearings, pistons, gears, ratchets, cams, clutches, and other parts. A metal probe serves as a microphone to locate the exact source of noise; sound impulses are transmitted through an amplifier to headphones.

Anco Instrument Div, 4254 West Arthington St, Chicago 24, Ill

THEY CAN TAKE IT...and DO!
...and still maintain accuracy

STANDARD *Dial Indicators*

Built to stand the knocks—often unavoidable

NEW - with Years of Service Ahead

REGULAR
AGD SERIES

AGD SPECIFICATIONS THROUGHOUT

Made in 22 models including 4 dial diameters, 7 different graduations. Also 90° models (stem perpendicular to back). Long Range and Long Stem types.

Decimatic
SERIES

AGD SPECIFICATIONS except Range and Marking

For especially fine checking, extra high repeatability and accuracy. Marked in decimals. No whip of hand. 16 models.

This One Was New...
Years Ago -
Still Serviceable

Obviously it has withstood hard usage, yet indicators such as these are constantly being reconditioned (at a fraction of the original cost) — to return still more dependable service to the owner.

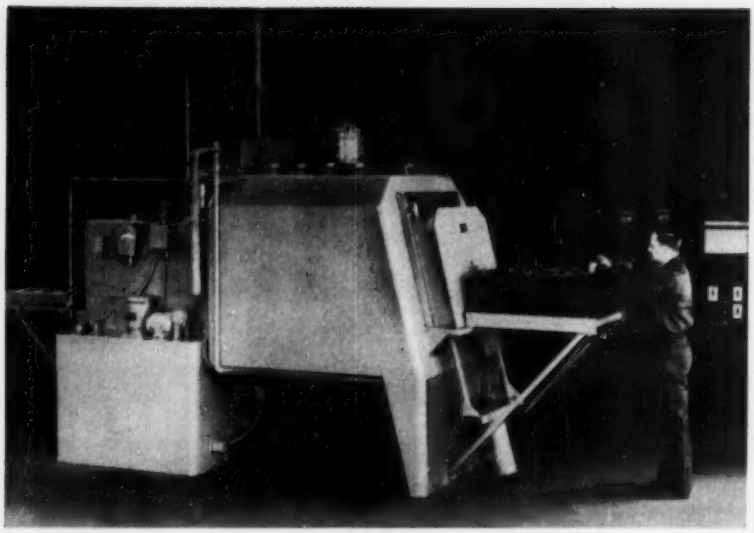
You wouldn't treat your watch the way some indicators have to be treated. Standard Dial Indicators are built to give continuing accuracy while standing the knocks.

Outstanding Reason for the Durability Built into Standard Indicators is the

SHOCKPROOF MECHANISM

Proved by experience to prolong instrument life greatly, Standard's Shockproof Mechanism protects internal parts right from the spindle on. Furnished regularly in most models, not treated as an optional extra. Standard Indicators give longer, trouble-free life, need fewer repairs, are dependable. These facts add up to "Greater Economy."

STANDARD GAGE CO., Inc., *Poughkeepsie, N.Y.*



Ipsen Forced Convection Heating Unit Handles 400 Lb Per Hr

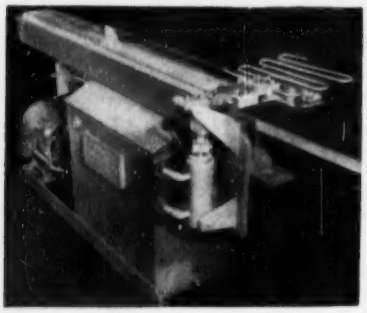
An automatic heat-treating unit, operating at temperatures to 1850 F is sealed to provide absolute atmospheric control during the heating and quench cycle.

The forced convection system has radiant heating tubes, baffles, and fan mounted in the roof of the furnace. Heating tubes can be gas-fired or electric.

Work is loaded directly into the heating zone and, after proper time at heat, is transferred onto a quench-cool rack which holds the load for atmosphere cooling, or lowers it for oil quench.

The T-400 is used to normalize, stress relieve, harden carburize, carbonitride, and braze. It can be supplied with a special insulated tank for martempering or hot oil quenching.

Ipsen Industries Inc, 715 So Main St, Rockford, Ill



Coil-Bending Machine

Small, semi-automatic machine for serpentine coil bending has been designed especially to fit production line needs. It is equipped with a single control lever, a stationary bending form, rotating wiping shoe, and a semi-circular table to maintain long coils in a horizontal position during the sweep of the bending cycle.

After the first bend is completed, the stock is rotated 180° before clamping for succeeding bends. One movement of the operating lever initiates the entire clamping and bending cycle. Rotating wiping shoe operates with a cam effect which allows the operator to return the wiper immediately after completing the bend by reversing the operating lever.

Production averages 450 bends per hour. Machine will handle tubing up to 1 in. OD, 16 gage and 5 ft in length. Die height of machine from the floor is 35 in., and overall dimensions of the base of the unit is 74½ x 15 in. Unit is equipped with a Vickers self-contained power pack, which provides a bending speed of 29 rpm.

Many hand-bending operations, and a variety of short run work, can be converted at low cost due to quick changeovers of setup. Price, with tooling, is approximately $3500.

Pines Engineering Co, Inc, 601 Walnut St, Aurora, Ill

Hydraulic Cylinders

New line of hydraulic cylinders is available for working pressures up to 2000 psi (3000 psi in non-shock service).

Series J cylinders have all-steel bodies, bored barrels, hardened piston rods, rod scrapers, and new cartridge type packings. Score-resistant, hardened piston rod, and improved gland packing protected by rod scrapers, is said to assure longer service life in processes where abrasive dusts cannot be avoided. Barrels are bored before honing to insure precise piston ring fit for full length of stroke. Units are regularly available for oil or water hydraulic service in bore sizes up to 10 in. dia.

Hydro-Line Mfg Co, 725 19th St, Rockford, Ill

Screw Extractors

These screw extractors are designed for quick, easy removal of broken screws, bolts, studs, or other threaded forms without injury to tapped threads.

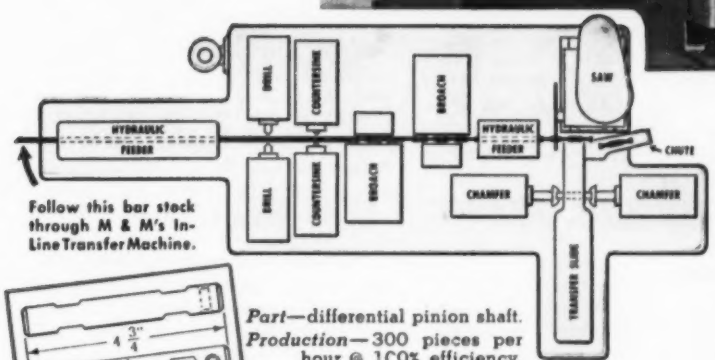
Available in nine sizes, individually packed, and in sets complete with maple block stand.

J H Williams & Co, Buffalo 7, NY

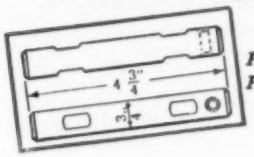
CARRIER GAGE checks pitch diameter of the internal root forms in jet engine blade carrier. Carbide roll-type anvil and carbide gaging roll on a pivot arm which operates the air nozzle are set to minimum and maximum masters. Another special gage checks blade root. Both are used with standard Model F comparator. — *Pratt & Whitney Div, Niles-Bement-Pond Co, West Hartford 1, Conn*

MP/SF

Typical M & M progressive IN-LINE automatic transfer machine.



Follow this bar stock through M & M's In-Line Transfer Machine.

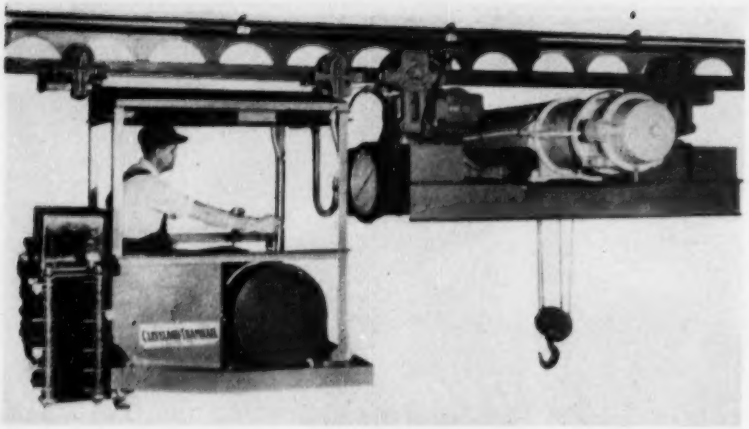


Part—differential pinion shaft.
Production—300 pieces per hour @ 100% efficiency.

Motch & Merryweather's forward-looking design *unitizes* a number of operations in the same machine. You obtain maximum usable production per square foot of floor space. Furthermore, you effect the greatest possible savings in time, overhead and operating costs.

Manufactured by —THE MOTCH & MERRYWEATHER MACHINERY CO.—
CLEVELAND 13, OHIO
Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY • MACHINES AND EQUIPMENT

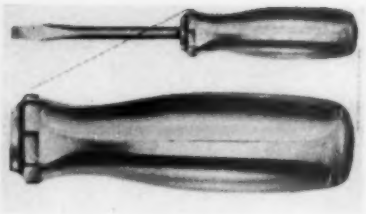


Cleveland Tramrail Carrier Can Weigh Loads Handled

A hydraulic cell scale built in this overhead traveling carrier, permits weighing all loads handled. Pressure from the cell is transmitted to the scale dial by hydraulic tubing. The scale weighs in pounds or kilograms as desired.

Travel speed of the tramrail carrier is 300 fpm. Hoist has a speed of 38 fpm and a lift of 36 ft. Travel and hoisting motors are provided with variable-speed controllers. Load capacity is 3 tons.

Cleveland Tramrail Div, The Cleveland Crane and Engineering Co, Wickliffe, Ohio



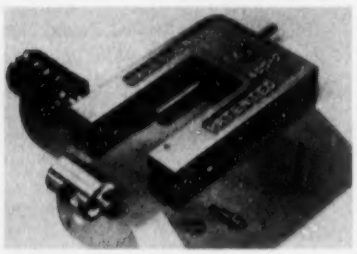
Non-Rolling Handles

Line of Proto screwdrivers has redesigned handles shaped to fit the hand, with depressions for the thumb and forefinger to allow great downward pressure with little squeezing effort. Larger dia permits more powerful grip.

Four deep, wide, lengthwise flutes keep the screwdriver from rolling; an octagonal shape at the lower end of the handle, replacing the round design, also prevents rolling. A larger surface on the butt end allows greater pressure with the palm.

Thirteen new screwdrivers have been added to the line to provide a more complete selection of bit widths and blade lengths. Five are regular-type screwdrivers with standard bit and square shank; eight are cabinet-type with straight bit and round shank.

Plomb Tool Co, Los Angeles, Calif



Hole Punching Units

Wales CJ hole punching units have been equipped with a new design feature which provides a positive die retainer and a simplified interchangeable die removal method; it permits interchangeable dies to slip-fit in the holders and be fastened into position by a threaded pilot pin, tightened or removed with a hex wrench.

Each unit consists of a holder that carries the punch, die, and stripping mechanism; this eliminates necessity of attaching punch to press ram and assures permanent alignment of punch and die. High-cost die-setting time is eliminated.

Setups are made on T-slotted plates or templets for stamping presses and on T-slotted plates, rails, or strip templets in press brakes. By placing this setup on the press bed it is ready to start punching with the first stroke of the press without adjusting the units, punches, or dies. Due to the uniform shut height of the units, the press ram only requires one adjustment, regardless of the number of hole punching patterns placed in operation. Press downtime between setups is reduced to a matter of a few minutes.

Units are available in three holder widths with maximum punch dia of ¾ in. for use with metal up to ¼ in. thick. Pedestal-type die permits punching holes in angles as well as sheets.

Wales-Strippit Corp, 345 Payne Ave, North Tonawanda, NY

Lubricant

Lubricant C-40 has been developed for use on lithographing oven chains. It is said to soften carbon residues deposited on chains by petroleum oils, facilitating easy removal.

The lubricant contains colloidal graphite dispersed in a synthetic fluid; it has a flash point in excess of 500 F, a carbon residue of less than 0.01%, and is wax-free. It is non-toxic and can be stored for long periods without danger of settling. Compound may be applied by brush, oilcan, or automatic devices.

Molyflo Corp, Greenwich, Conn

Rotary Broach Finishes Holes

Rotary broach finishes holes to an accuracy of 0.0001; final surface finish produced is claimed to be from 10 to 40 rms.

Tool removes metal by shear-cutting action which forces chip ahead of it, eliminating chance of chip scoring the hole being finished. Cutting edges of the broach form a circle; edge is said to be 10 to 20 times longer than that of a standard reamer.

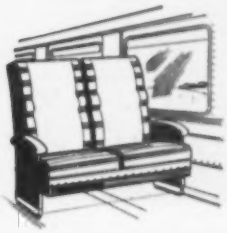
Circular cutting edge and end pressure cutting broaching action eliminate any tendency to produce elliptical, bell-mouthed, uneven, or oversize holes. Available in all sizes from 1/16 to 3 in. in 1/64-in. increments.

Shearcut Tool Co, 7045 Darby Ave, Reseda, Calif

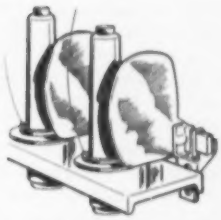
Our Fiftieth Year

A START FOR THE FUTURE

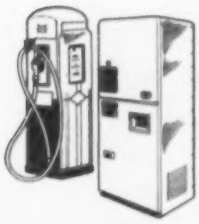
UNBRAKO BUTTON HEAD SOCKET SCREWS feature the following: threads to head; low head height; nonslip internal wrenching; hex socket that minimizes possibility of marred or mutilated heads; fully formed threads—Class 3 fit; heat treated alloy steel; standard sizes from # 8 through ½" diameter.



USE UNBRAKO BUTTON HEAD SCREWS on transportation equipment—door and window frames, paneling, seats.



On textile machinery—slashers, twisters, bobbin shields.



On sheet metal assemblies—beverage coolers, gasoline pumps.

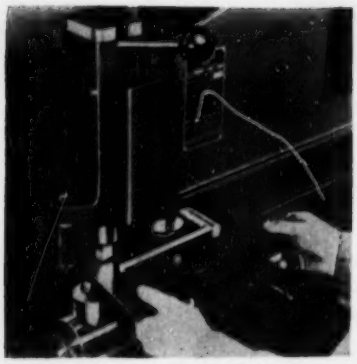
Have you checked our UNBRAKO standards?

We suggest you do, because a standard UNBRAKO delivered from your distributor's stock means faster and better service. A standard will do the job as well as a special at much lower cost. For details about UNBRAKO Standards, write SPS, Jenkintown 1, Pa.

Write for UNBRAKO Standards

UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA



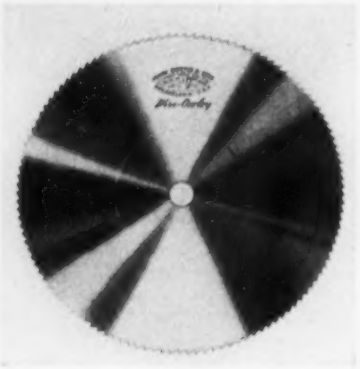
Contour Shear Eliminates Feed Resistance and Work Turning

Tru-Edge unit is designed for inside cutting, beading, and forming sheet steel. New shearing principle eliminates resistance to feeding and turning the work; feeding of material may be started while ram is operating. Inside cutting requires no starting holes, eliminating preliminary operations.

Cam action provides vibrationless operation. Material is sheared rather than punched to provide smoothly-cut edge. Adjustable bottom shearing die is quickly set for various thicknesses of material.

Machine cuts from 10 to 36 fpm, depending on gage and material; capacity is up to 10 gage mild steel, and 11 gage stainless. Throat depth is 48 in., which can be increased by arranging centers outside.

Wales-Strippit Corp, 345 Payne Ave, N Tonawanda, NY

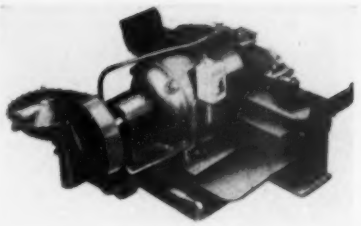


Circular Saw

This circular saw, newest addition to the Diss-Croloy line, has been specially designed for cutting nonferrous metals such as copper, brass, aluminum, etc.

Blade is made from high-carbon, high-chrome Disston steel, said to have edge-holding qualities superior to high-speed steel. Available in dias of 6, 8, 10, 12, and 14 in.

Henry Disston & Sons, Inc, Philadelphia, Pa

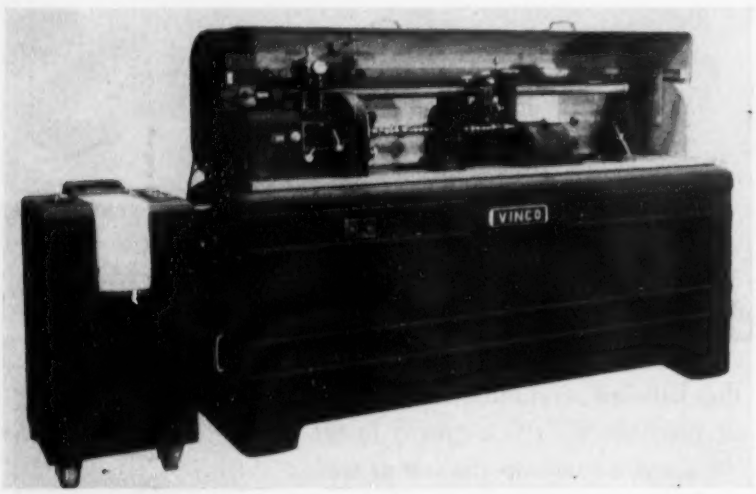


Rogers Combination Grinder Sharpens Knives and Tools

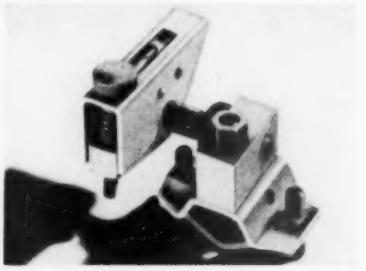
Type EE combination bench grinder handles machine knives up to 22 in. in length and has attachments to handle gumming of circular saws up to 20-in. dia, drills to 1-in. dia, or tools.

Separate grinding wheels for these operations are powered by the same 1 hp motor. Knives are mounted on an automatic, reciprocating table which moves in front of the 6-in. cup grinding wheel. For tool grinding, an 8-in. dia, ¾-in. wide wheel is provided. Attachments are available for saw gumming and drill grinding, and to equip the machine for wet grinding.

Samuel C Rogers & Co, 185-201 Dutton Ave, Buffalo 11, NY



ENGINE CAMSHAFTS are checked against a master cam in this comparator to determine variances in cam contour of the part. Master cam is ground and lapped to accuracy of 0.0001 in. Contour variances are shown on a 0.0001-in. dial indicator and simultaneously recorded on a linear chart. Readings and recordings are identical, and will repeat within 0.0001 in. Cam lobe and keyway timing errors appear on an inbuilt, Vernier-equipped, graduated plate; timing check is accurate to within one minute of arc. Although instrument is tooled for an individual camshaft, wide range of sizes can be accommodated. Work capacity: between centers, up to 44 in.; journal dias, up to 2⅜ in.; cam base circles, up to 1⅝ in.; cam rise, 0 to ⅜ in. — *Vinco Corp, 9111 Schaefer Highway, Detroit 28, Mich*



Bore Depth Control Recorder

Pekay Depthmaster is a control device which permits bore depth control to 1/1000 in. on any turret lathe, hand screw machine, or other machine tool where stops are employed. It can be attached to the hand wheel of any machine by the operator in one minute.

Unit accurately and clearly records exact amount of pressure against the stop at all times, giving operator complete and continuous control of his work down to the last thousandth.

Depthmaster has no moving parts to wear; it functions on a gravity principle, thus progressive errors which can develop in the use of spring-loaded dial indicators are eliminated.

Pekay Steel Fabricators, 865 Sangamon St, Chicago 22, Ill

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Spiramatic
JIGMIL®

® REG. U.S. PAT. OFF.

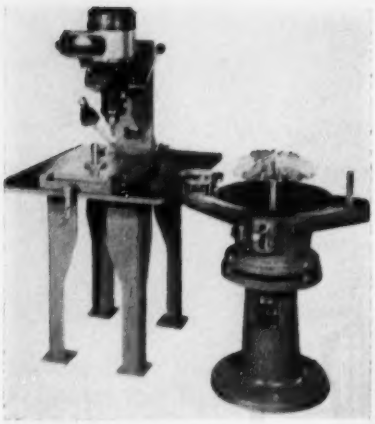
PRECISION BORING and MILLING MACHINES

• a range of basic machines
for ultra precision boring and milling

for the latest developments in precision boring equipment . . . consult—

DEVLIEG OF DETROIT

DEVLIEG MACHINE COMPANY • 450 FAIR AVE., FERNDALE, DETROIT 20, MICH.

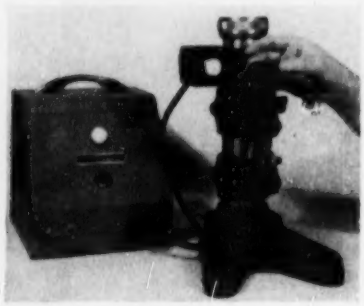


Balancing Unit for Piece-Part Correction

This unit has been developed to make corrections on piece parts that are to be put in balance. It is a simplified method of correction by milling where removal of weight is required and drilling not feasible.

Arrangement consists of a milling attachment mounted on a sturdy, ground worktable with coolant trough. Fixture for the piece part to be corrected is mounted on ways and moved against an end mill and a milling attachment. A manual feed screw with a graduated color for measurement of stock removal provides for a quick and simple operation. The device has been designed for use with the Taylor Hi-Eff balancing machines.

Taylor Dynamometer & Machine Co, Milwaukee, Wis



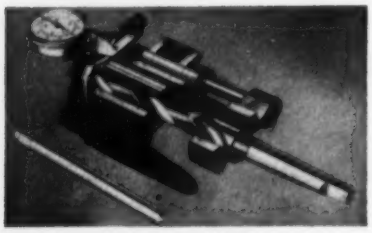
Electronic Micrometer

Model W electronic micrometer permits measurements to 0.00002 in. without any pressure being exerted on the work. The instrument is not a comparator; all measurements are direct.

The measuring head consists of an extremely accurate micrometer screw. An electronic circuit, sensitive to 0.000005-in. displacement at the micrometer tip, gives a visual indication at the moment of contact, but before pressure is exerted.

The unit is especially designed for use in research, development, and performance testing of diaphragms and bellows used in flight instruments, temperature, refrigerator, and other types of controls where pressureless operation is required.

J W Dice Co, 1 Engle St, Englewood, NJ



Gage Checks Drill Points

The Matrix drill point measuring instrument checks quickly correct drill point angle and its centrality. Two V's support the straight or tapered shank drill. On a common indicator dial, centrality is read directly to 0.001 in., and angle to one degree.

This portable unit will insure correct hole size and optimum drill life. Setting standards are supplied for standard drill point angles.

Instrument is available in two sizes: ¼ to ¾ in., and ¾ to 2½ in.

Engis Equipment Co, 431 S Dearborn St, Chicago 5, Ill

Quikupl is a coupler with a rubber sealing ring bonded inside to overcome the difficulty in welding as well as threading of stainless steel piping. Ceiling rings are made from Neoprene W, with high resistance to compression set—only 15% at 70 hr at 212 F.

Minnesota Rubber and Gasket Co, Minneapolis 16, Minn

Onepiece plastic welding helmets are made of Fiberglas reinforced with polyester resin. Seamless construction of No. 700 Series insures extra strength; material is moisture-proof and resistant to high heat, and lighter than vulcanized fiber. No. 3 headgear is standard equipment on the helmets. Made from a new plastic that will not absorb moisture, it conforms readily to any shape head. Four insulated glass holders are available: No. 1130 plastic stationary; 1136 plastic lift-front; 1085 insulated steel; 1096 insulated Dowmetal lift-front.

American Optical Co, Southbridge, Mass

Cryptolite, a new cohesive agent, has been added to Swift-Floor plastic floor resurfacing compound. Irregularly-shaped crystals of the mineral pack together to form an unusually hard, non-skid floor surface which permits the heaviest loads to roll easily 60 seconds after application. Compound containing the new material is easily applied by priming the old floor surface, filling, and tamping or rolling to a hard, smooth surface. Can be applied over wood, concrete, brick or steel floors, indoors or out; it is fire- and spark-proof, and easy to clean.

The Monroe Co, 10703 Quebec Ave, Cleveland 6, Ohio

Pennsalt EC-54 is an emulsion cleaner which will not boil off, evaporate or flash at use temp. It cleans nonferrous metals without tarnishing and will protect ferrous parts from in-plant rusting. Liquid has a flash point of 260 F, fire point of 300 F, and 95% boils within a range of 500 to 600 F. Ferrous parts are protected from rusting for one to six weeks; period can be lengthened by using stronger solutions. One cleaning unit can be used to process all metals in the plant.

Pennsylvania Salt Mfg Co, 1000 Widener Bldg, Philadelphia 7, Pa.

Seamless light-wall tubing made by Superior, has been increased in size range from 1¼ in. OD max to 2 1/16 in. Applications include bellows for industrial and aircraft instruments, flexible metal hose, and low pressure heat exchanger tubes. Available in three stainless analyses—AISI types 304, 321, and 347, and in Monel metal; produced in three tempers: ‡1 fully annealed, ‡2 half-hard drawn, and ‡3 full-hard drawn. Length range is from 5 to 22 ft in random, multiple, or cut lengths.

Superior Tube Co, 1540 Germantown Ave, Norriston, Pa

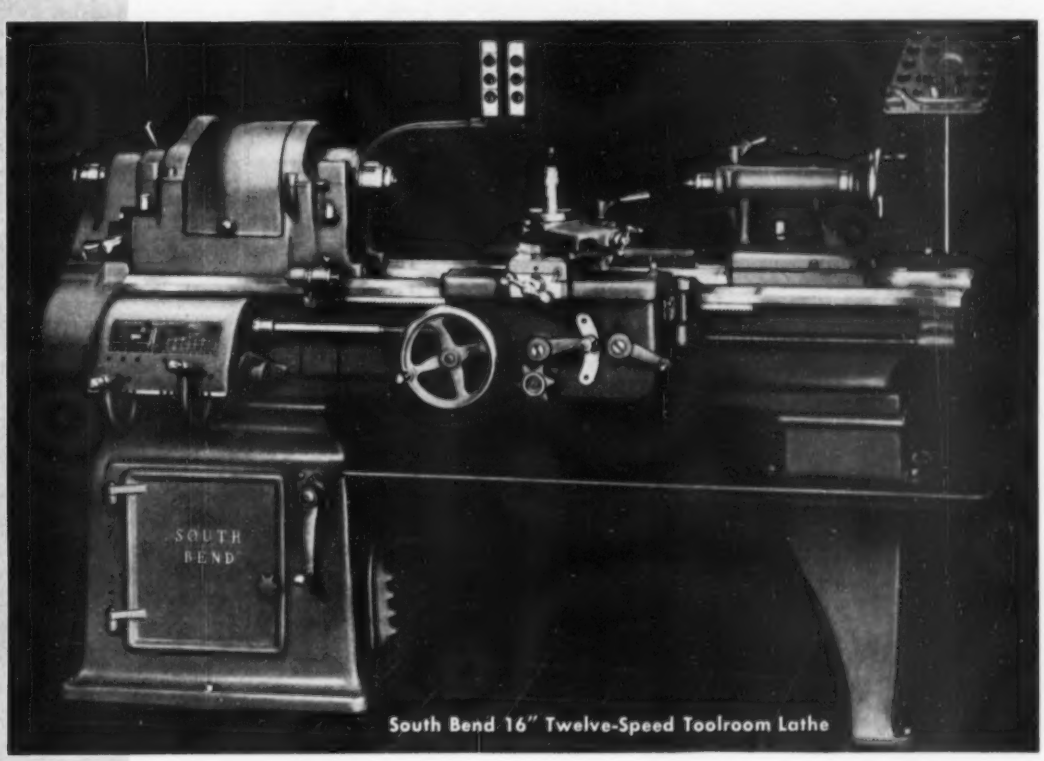
Maintenance coating, known as Flexcoat, protects against corrosion caused by acids and alkalis, can be brushed, sprayed, or dipped. It can be applied over old paints, has good adhesion to metal, wood, or concrete, and is available in a wide range of colors to identify machines and pipelines. Plastic resin finish dries by solvent evaporation; no change occurs in the film as it ages to lower inertness to corrosive products. Primer and top coat are homogeneous, eliminating possibility of intercoat separation.

Flexrock Co, Protective Coating Div, 3600-A Filbert St, Philadelphia 4, Pa.

Cuts Machining Time

SOUTH BEND 12 SPEED LATHE

The wide range of spindle speeds on this new lathe cuts machining time because the operator quickly selects the right speed for each operation. Pushbutton control provides a fast change from any high speed to the corresponding low speed. This versatility is further increased by 48 choices of longitudinal and cross feeds which insure maximum efficiency on every job. Also, you will find that its accuracy and ease of operation make your tough jobs easy. Send the coupon for complete information.



South Bend 16" Twelve-Speed Toolroom Lathe

SPECIFICATIONS

Spindle Speeds — 12. Direct drive: high range 300, 550, 945; low range 150, 278, 475. Back gear drive: high range 32, 70, 118; low range 20, 33, 60.

Spindle Bore — 1⅜".

Swing over bed and saddle wings — 16¼".

Swing over saddle cross slide — 9⅛".

Distance between centers — 33¼", 45¼", 57¼", 81¼", 105¼".

Collet Capacity — 1" maximum.

Longitudinal Feeds — 48 R.H. or L.H., .0015" to .0841".

Cross Feeds — 48, .0006" to .0315".

Thread Pitches — 48, 4 to 224 per inch.

SEND INFORMATION CHECKED:

☐ _____

☐ TOOLS & ATTACHMENTS

☐ 9" and 10" BENCH LATHES

☐ 10" to 16-24" FLOOR LATHES

☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES

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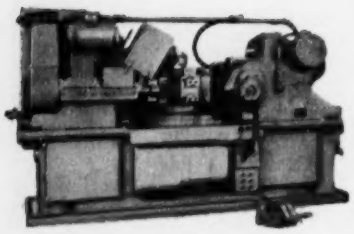

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When any of the various functions for which this machine is designed are performed on it, no further machining is required. The job is finished.

The basic "1-2-3" method—exclusive with Goss & DeLeeuw—provides for gripping work in the chuck and machining all ends either simultaneously or in sequence. By eliminating several handlings and set-ups, the "1-2-3" method produces finished pieces at a fraction of the time and cost ordinarily required.

Send samples of your work for time estimates. Ask for illustrated literature containing detailed information.

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

ROUND TABLE *Discussion*

FINDER'S FEE

Will establishment of a "finder's fee" policy result in the hiring of men more suited to specific jobs, men spotted and brought around by dependable employees who know the shop's requirements? Or will it lead to pirating?

IN A WORLD of changing values, many things which were at one time regarded as beyond the pale are now accepted as the normal thing to do. Forty-odd years ago a pat on the back from the boss was of greater value to the worker than an increase in wages.

Trade cycles and slumps were then the order of the day, and the artisan who could boast of continuous employment was frequently better off, financially, than his less fortunate brother who might be on a higher rate but engaged in fluctuating employment. To be a "steady man" made all the difference in your social position and the "steady man" instinctively felt his superiority over his less fortunate brothers. He was accepted in social circles denied to others who never knew when an idle spell was coming along, through no fault of their own. He could marry into circles slightly above his own social scale, and in that way his prospects of promotion were often improved. As a consequence, great efforts were put forth to honorably — and sometimes not so honorably — catch the eye of the boss and retain his goodwill.

In the circumstances and in the matter of shop contentment, the boss had a much less worrying job than he has today. In the engineering industry, personnel changes were, normally, the exception rather than the rule, and in any shop with a reasonably good reputation a vacancy could usually be filled several times over.

Although the younger generation today may not be aware of it, "finders" were plentiful, active, and commonplace forty or fifty years ago. They were, however, voluntary workers serving two masters, the boss and the call of kinship. Kinsmen were welcomed provided they measured up to the required standard. If the finders were established hands, the interests of the boss would be their first concern in recognition of past and present

STANDARD CARBIDE MILLING CUTTERS

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Ask for catalog listing all Super Standard Carbide Tools.

QUALITY CARBIDE TOOLS

Super TOOL COMPANY

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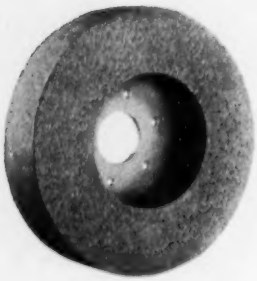
but... for carbide tool grinding

SIMONDS WHEELS

cost much *less*



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Grinding Wheels

Sharpen *your* carbide tools the economical way. Avoid damaging sensitive edges. Prevent shape distortion. Use Simonds' G Electrolon (silicon carbide) grinding wheel. It's the popular "green" wheel . . . less expensive than diamond wheels . . . but a "gem" for safe, cool grinding that prolongs tool usefulness.

Especially efficient for roughing and semi-finishing, these wheels are also frequently used for finishing, too. Made to high standards of accuracy, as are all Simonds Abrasive Company products . . . including grinding wheels, mounted wheels and points, segments and abrasive grain.

Write for your copy of our bulletin (ESA 181) about G Electrolon wheels, including type PM (plate mounted) and tool and cutter shapes—*All* available from stock. Your Simonds Abrasive distributor is equipped to serve you locally. We'll gladly send you his name too.

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DISTRIBUTORS IN PRINCIPAL CITIES

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favors; if they were younger or borderline cases, service would be rendered unto Ceasar in the hope of consideration to come. In all cases, the recommended one could be vouched for and the "finder" was always ready to start or fall by the results; indeed, he had no choice in the matter—woe betide anyone who spoke for a dud.

The finder in those days could always give chapter and verse concerning the character, experience and skill of the person recommended, and although employers then had an unwritten law concerning piracy, good men would change their job on the strength of information received from a pal regarding wages and conditions where he —the pal—worked.

So piracy is not new nor are finders either, but the finder's reward, as suggested by Al, is both new and novel to the engineering trade. To have suggested it to the chief of my youth would have been to give him cause for misgiving concerning my sanity. High treason would probably have been regarded by him as something slightly less offensive. However, in these present times of money madness and full employment, finders don't need to worry much about the goodwill of the boss. Unfortunately for him the boot is pretty much on the other foot, and since desperate diseases demand desperate remedies, I agree with Al that money payment should be made to the successful finder.

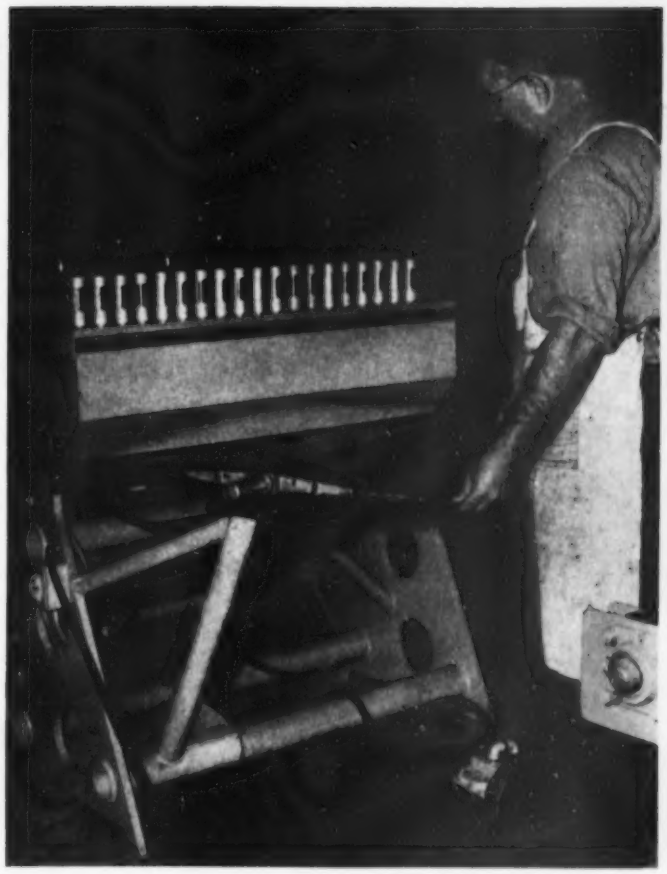
Ed's fear that a money inducement might result in chiselers being recruited is very much to the point and must be considered. With money in the offing, all present-day finders feeling just as important as the boss, if not more so, may not be scrupulous, and I would regard this operation as one calling for payment strictly by results. If a "find" proved to be an asset after, say, a few months' run, the finder might be recompensed, if he remained with

"We find it more efficient to hire one man to watch the clock for everybody."

Machine devised with 19 Keller AIRFEEDRILLS

Saves 83% of Time

needed for drilling guided missile fins



Airfeedrill Features:

- Accurate holes without costly fixtures
- Attaches in any position, at any angle
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- Used in close centers, and in tight places
- Easily shifted from job to job
- Drills metal, wood, composition, plastics

This ingenious device drills 19 holes simultaneously in the leading edge of a guided missile fin . . . then the fin is turned over and seven more holes are drilled in the trailing edge.

The entire operation takes only 36 seconds. Formerly the same job was done by hand and required 4.2 minutes—7 times as long.

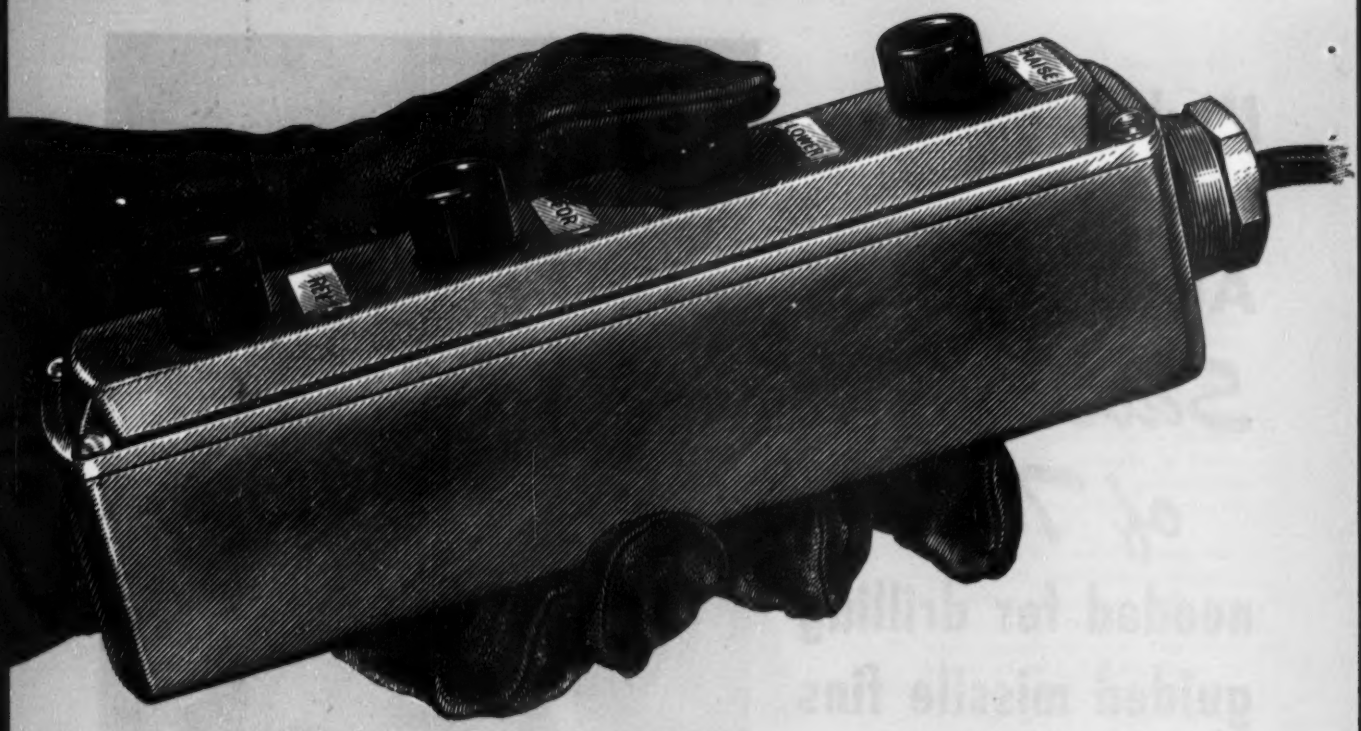
Keller Airfeedrills—19 of them—were incorporated in the machine because (1) they reduced tool design time, (2) they reduced tool fabricating time, and (3) they are reducing down time during production.

Automatic selection of the drilling pattern is accomplished electrically. Pressing once on a single control valve causes the desired Airfeedrills to start, advance, drill, and shut off—all automatically.

KELLER

Pneumatic Tools

KELLER TOOL COMPANY, GRAND HAVEN, MICH.

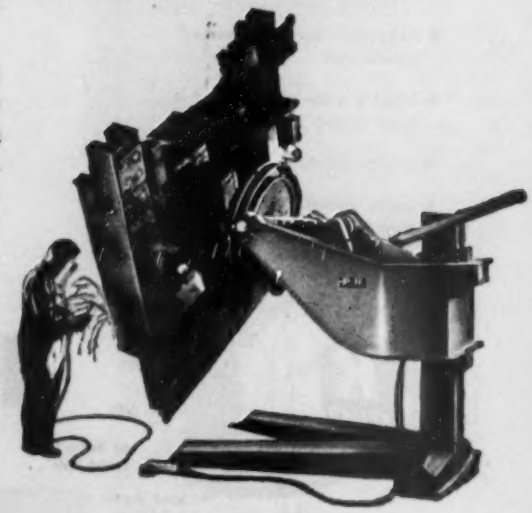


One finger is enough

to position heavy workpieces for fast, economical downhand welding

- with P&H positioners

Cut costs as much as 50% — position the weldment, not the operator! A touch of a control button does the work — saves handling time. Welding is downhand — permits using a larger rod for faster deposition. Welds are smooth, uniform. P&H Positioners are available in capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models. Ask your P&H representative or distributor for further information — or write us.



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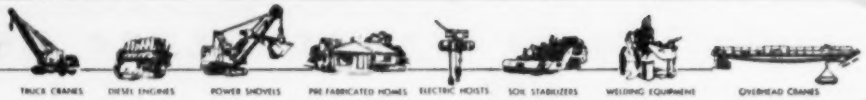

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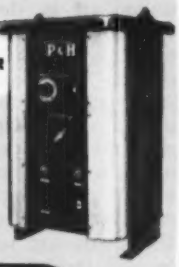
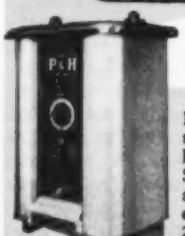
put welding in your plant on a low-cost, high-production basis

P&H DC RECTIFIER WELDER



Has Dial-lectric Control for instantaneous heat selection at the work. Three sizes, 200, 300, and 500 amps., NEMA rated.

P&H WELDING TWINS



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Has P&H Dial-lectric Instantaneous Remote Control. Sizes up to 625 amps., NEMA rated. Connectable to 220 and 440 volts.

P&H WN-301 Engine-Driven DC ARC WELDER

Portable. Equipped with Dial-lectric Control. Runs at only 1750 rpm. Welding service range, 60-375 amps., NEMA rated.

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13 types that take the problem out of welding high-sulfur, free-machining, low-alloy, and high-strength steels; castings, etc.

Ask your P&H representative or distributor for complete information, or write for free bulletins.

P&H WELDING DIVISION

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4514 W. National Ave., Milwaukee 46, Wis.

the company and continued to please.

This is fairly revolutionary writing for an old timer, but here in Britain, at least, there are precedents. In the realm of sport and other entertainment we have always had our scouts running around in their spare time, spotting talent for football clubs and for the show business, so why not for engineers?

In a free democracy, there really can hardly be piracy in the matter of labor recruitment since, theoretically at least, a man can change his job at will and a boss can recruit whither he listeth. Ironically, over here in Britain there is supposed to exist between employers a gentleman's agreement not to entice away each other's men with offers of more money than the recognized district rate. In times of stress and urgent need, however, some of the gentlemen were tempted and became guilty of benavior unbecoming captains of industry; they pinched the other fellow's men by making tempting offers. The district rate was agreed on by the employers and the unions and for that purpose the country was divided into districts, the rate varying from district to district according to the cost of living in each. London, being expensive to live in, always had the highest district rate. It should be noted, however, that the district rate was a minimum rate; no union agreement was infringed if more was paid. Thus, the gentleman's agreement was often honored in the breach rather than in the observance, and who can blame the worker for selling his skill in the highest market?

Is the dependable employee a good judge of others? On the whole, my experience shows that the dependable employee is a good judge of others if dependable includes the

"And then the dear sweet boy slipped this diamond ring on my finger and we're engaged."

. . or Released in an Instant

CLINCH TYPE

INSTRUMENT MOUNTING

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STANDARD

Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

Bolt threads are gripped tightly . . . these famous nuts *never* work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study *your* fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

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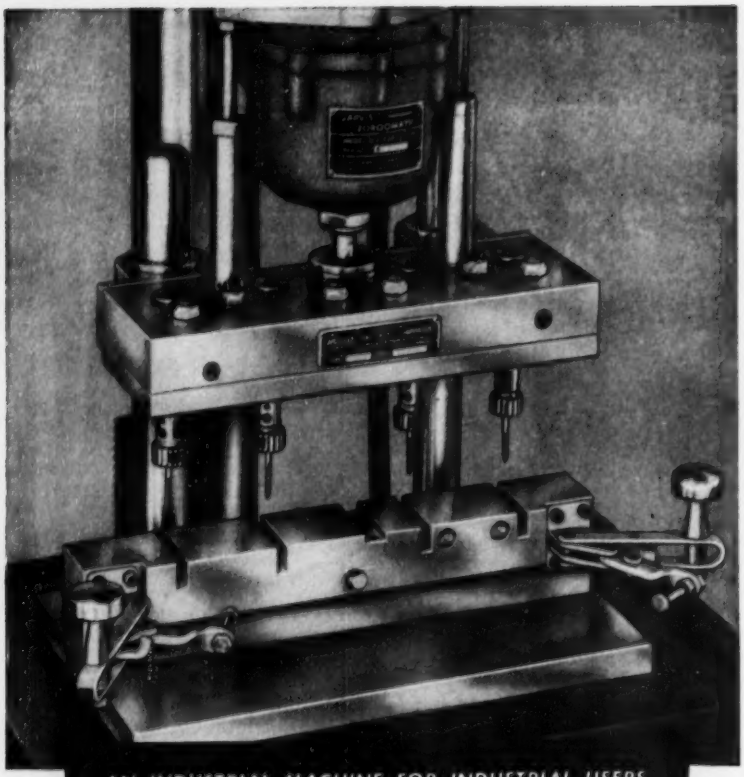

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We invite you to consult with the factory-trained Jarvis representative in your territory to analyze and determine the full requirements of your tapping and drilling needs. Write for catalog.

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THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

man's skill and experience and not merely his loyalty to a chief, important though that be. If the finder is dependable in the sense that he is loyal, and a first class, level-headed tradesman, then his recommendation in favor of a given man should go a long way with a boss having a job to fill.

Long before full employment had become a labor slogan and an accomplished fact I became indebted to many of my good men for particulars of others employed elsewnere but considering a move. A falling off in the order book, no payment by results, long distance to travel to work, etc., were all good reasons for considering a change of job. Coupled with an assurance from one on whose judgment, experience, and integrity I could depend, this information frequently resulted in a little piracy on my part! I cannot recall one single instance of disappointment with a choice made on such recommendation.

M Donald
Lanarkshire, Scotland

•

REALLY A SOUND idea; a fee to be paid only after the goods have been delivered, as it were. It is, therefore, cheaper than advertising. To advertise may be to cry in the wilderness, and no one answers; time is lost and one's money is wasted.

Paying the finder's fee is the better method because its insidious character makes snake-in-the-grass approach possible. A specially good man in the employ of a competitor may be singled out for approach, and if successful, a double blow can be dealt—and at $10 a time; this is surely cheap.

It may be wise, however, to keep in mind possible reactions. If the would-be pirate were not the only man really awake and the other fellow became aware of these piratical aims, the natural consequence would be retaliation, and the last stage could prove to be more difficult than the first. One could wonder what would be the thoughts of the pirate when his piracy was discovered. Would a hole made by the smallest of worms be too large to hide his pygmy soul?

The practice of finder's fee would appear to be of a boomerang character, injuring the thrower of the boomerang, rather than the intended victim; how petty, how useless, and surely how foreign to engineering standards and aims, precision of method, quality of production. These do not seem to mix with the gutter-

snipe method of the labor pirate.

But—and this is a real hope, the good, self-respecting workman may refuse to dance to the pirate's tune or to work for him. He may object to being used as a pawn in a not-too-clean game. He may think that the pirate's works and general treatment may be equally suspect. . . . It is an old saying that "one cannot touch pitch without becoming defiled."

P E James
Lincoln, England

•

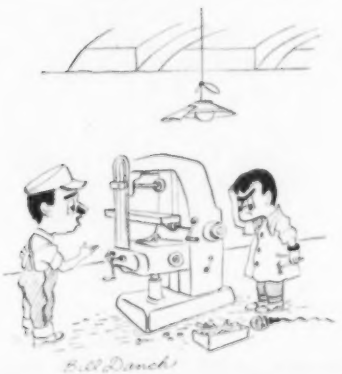
BLOWOFF

Can a foreman accept criticism from his men without losing face? If the criticism is legitimate, will the workers have more or less respect for the foreman if he takes it?

How much can a foreman afford to take from his men, helpful or otherwise? Everything; rudeness and insubordination excepted. No foreman can afford to ignore comment or suggestion from his men, provided ordinary politeness is observed by the man or men concerned.

Even if ordinary politeness is somewhat strained, common courtesy should not desert the foreman who should always politely assert his superiority by observing elementary good manners. By doing so the foreman will set a good example and teach a useful lesson to all who may mistakenly regard rudeness as cleverness.

Much, of course, depends on the quality of the foreman. If he is widely experienced, confident in his knowledge of the job and capable of organizing for high quantity and quality production, he will have nothing to fear from his men. No foreman, however good, can think of everything, and the operator in his narrower and more specific field



"Before you call Maintenance, why don't you give it another good kick?"

ACCURATE SQUARES
CONCENTRIC SHANKS
UNIFORM FLUTE SPACING
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PRECISION GROUND CHAMFER
CUSTOM MADE AT NO EXTRA COST!
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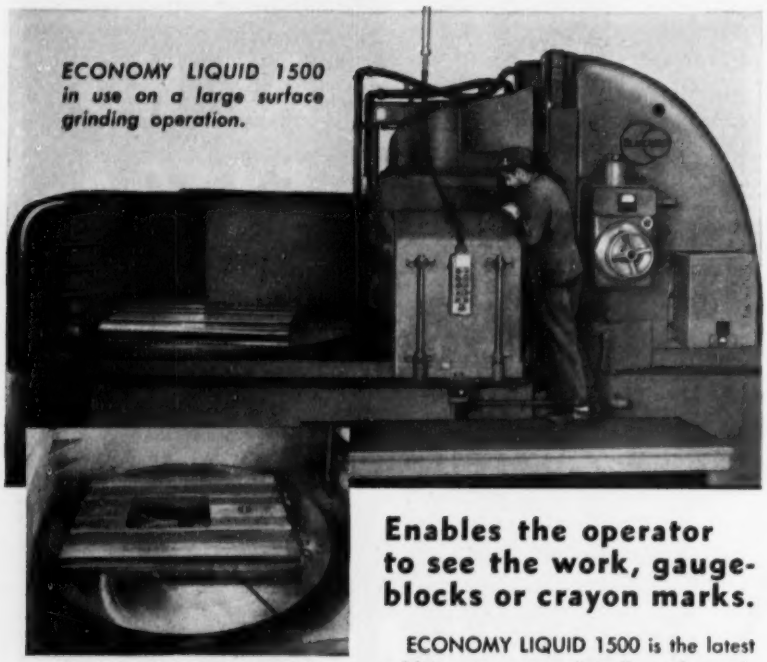
ECONOMY LIQUID 1500 ..the *Transparent* coolant for GRINDING



ECONOMY LIQUID 1500 in use on a large surface grinding operation.

The large piece set up on the 85" chuck, ready for grinding.

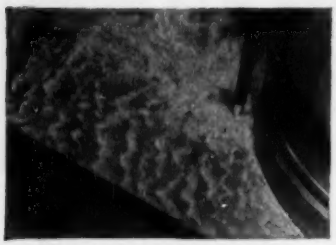


Photo shows actual grinding operation in progress. Operator can see the work, gauge blocks or crayon marks through the green, transparent coolant.

Enables the operator to see the work, gauge-blocks or crayon marks.

ECONOMY LIQUID 1500 is the latest addition to a complete line of metal-working lubricants in which The White & Bagley Company has specialized since 1888. Exhaustive tests prove that this *transparent* coolant used in a ratio of one part to 150-200 parts of water results in:

- **Unusually open and free-cutting wheels**
- **Extremely rapid chip settling**
- **Clean machines**
- **A non-irritating coolant**
- **Excellent rust protection**
- **Practically no foam**
- **A long-lasting "sweet" solution**

AT A COOLANT COST OF ABOUT 1¢ A GALLON

For detailed information on ECONOMY METALWORKING LUBRICANTS— *write for a copy of our latest catalog.*

ECONOMY METALWORKING THE WB CO LUBRICANTS

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Originators of Grinding Lubricants

can often note minute optional detail which could easily escape the notice of the foreman, with his greater resoponsibilities and more numerous distractions. As a consequence, the good foreman will appreciate comment; even if it be critical of his disposition, he may even suggest some further improvement in order to show interest and give encouragement, thereby enhancing his own prestige among the men.

A note of warning may not be out of place here, especially to younger foremen. On no account should a suggested improvement on a man's suggestion or comment be petty or trivial, made, not as a helpful contribution, but merely for the sake of picking holes. Few actions of a foreman can be more infuriating to a good operator, anxious to show his paces and to qualify for recognition, than to offer him an obviously puerile criticism on some well-founded suggestion or comment. If comment, suggestion or criticism of shop methods or supervision offered by a man contains only a slight blemish, it is good business on the foreman's part to ignore the unimportant weakness or, at all events, to soft-pedal his reference to it. If adverse comment by the foreman is thought to be necessary at all, it should be friendly, brief, and casual and should in no circumstances cause the man to feel disappointed or rebuffed.

Even in an extreme case of the man's view being absurd, any thought of Al "bawling him out" is rude and crude, to say the least. Besides, the more absurd the suggestion or criticism, the less cause for alarm on the foreman's part and the easier his task in politely disposing of the matter. While it is important that the foreman should

"Don't get too self-important—I've turned down that job of yours more times than I care to remember."

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Yosemite Falls, Yosemite National Park, drops a total of 2,425 ft. in three leaps; Upper Fall, 1,430 ft.; Middle Cascade, 600 ft.; Lower Fall, 320 ft. In spring the roar of this mighty cascade can be heard throughout the upper Yosemite Valley.

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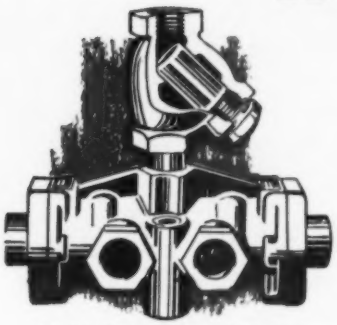

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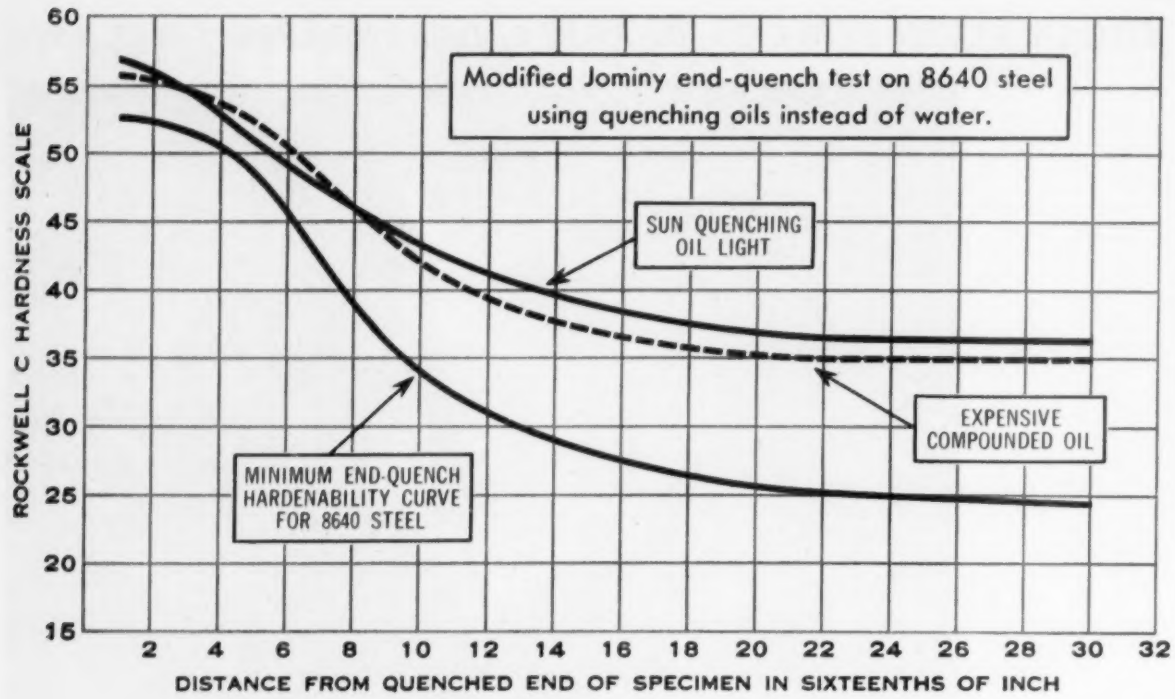

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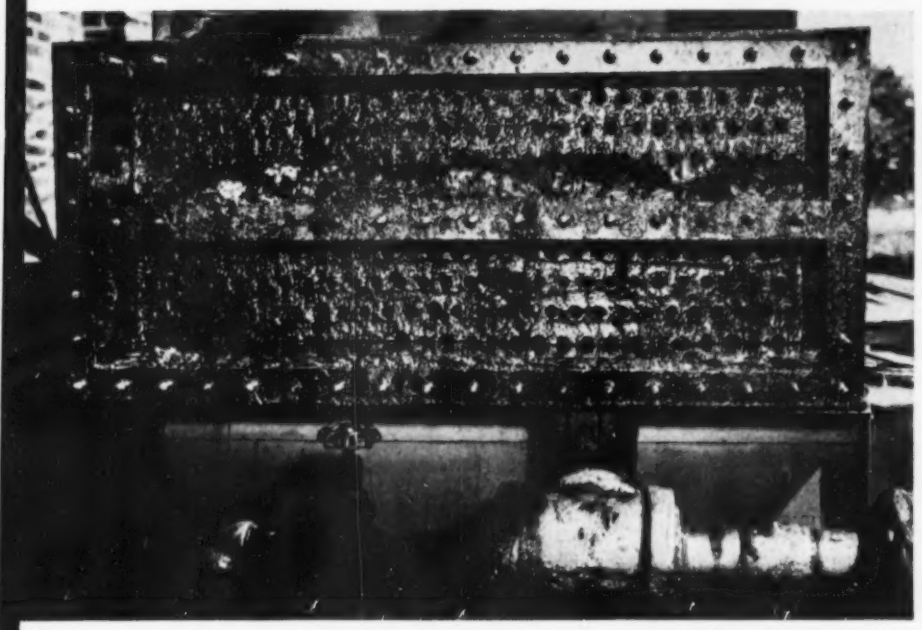
THIS PLANT QUENCHES ALL TYPES and sizes of automotive and aircraft forgings. Sun Quenching Oil Light serves all five of the 2400-3000 gallon systems. In the seven years the shop has been using this oil, no unit has been down except for normal mill scale removal.



AN OIL THAT FORMS SLUDGE CLOGS oil coolers, increases maintenance and operating costs. Sun Quenching Oils have a natural detergency which helps keep the systems clean and removes any deposits that may exist.

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keep his end up, it is equally important he should resist the very human temptation to score off the man.

The *complete* foreman will listen attentively to everything his men have to say, legitimate or otherwise, if for no other reason than to sense the atmosphere of the shops and estimate the capabilities of the personnel. The more intimately he is aware of the working of their minds, as well as of the work of their hands, the better position will he be in to shape his course and trim his own sails.

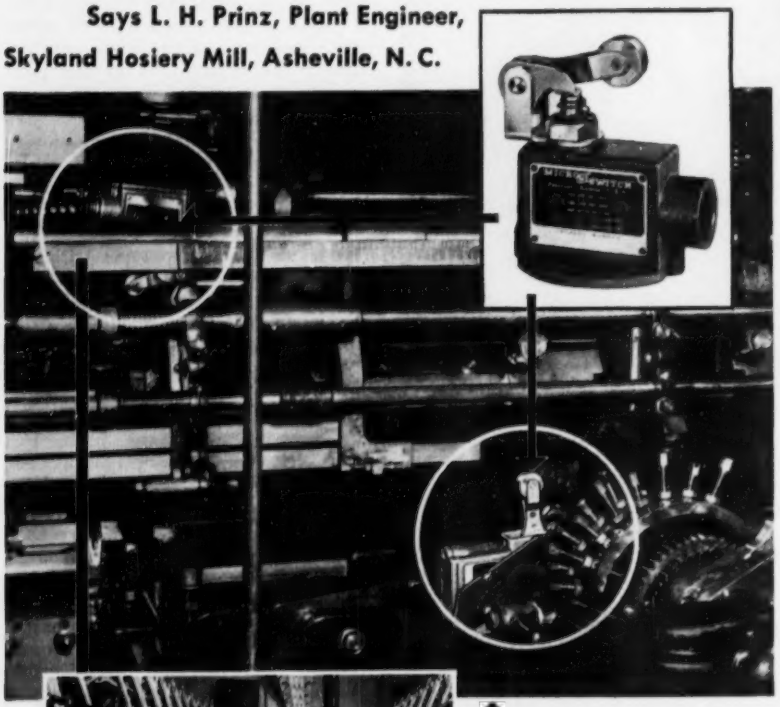
It is a great mistake for an executive to run away from the criticism of a subordinate; in most cases there will be a cause and the voicing of the criticism is merely an effect of the cause. The foreman should listen attentively to what the man has to say, thank him for the interest he has shown in the company's business and promise to give the matter his close and immediate attention. He should honor that promise in letter and in spirit, taking the very earliest opportunity to examine the man's views in detail and in the light of his own more informed knowledge of the policy instructions laid down by the company. In no circumstances should he put off doing what he may regard as a tiresome duty. If his executive preoccupations prevent him from studying the matter during shop hours, then he must face up to tackling the job in his own time. By following this advice, the foreman may be surprised to note how often the criticism will turn out to be a mare's nest, due to the man being accustomed to look at the picture from the shop angle only.

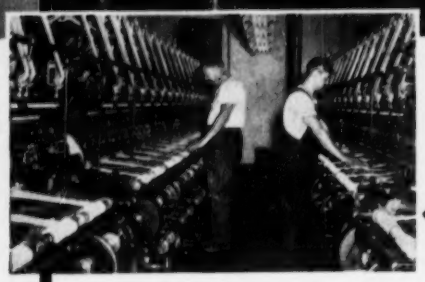
If careful attention be given to *all* suggestions, the resourceful foreman will sometimes find himself pre-

"Don't criticize me today, please—my kid broke our picture tube and the warranty doesn't cover that."

"Since installing these two MICRO switches we have had no record of needle breakage"

Says L. H. Prinz, Plant Engineer, Skyland Hosiery Mill, Asheville, N. C.





Close-up view of the two MICRO switches installed on the carrier rack at the Skyland Hosiery Mill, Asheville, N. C. The switch at the upper left cuts off current in case of misadjustment of the carriage. The lower switch shuts off power if narrowing fingers endanger the needle bed.

View of portion of the Skyland Mill showing plant equipment that has been made safer and more automatic by the use of MICRO precision switches.

● Not only have these MICRO switches prevented needle breakage but, according to Mr. Prinz, they have also reduced the danger of jams on the carrier rack that can cost from $500 to $2000 to repair.

Skyland's engineer installed one switch on the carrier rack in such a way that it stops the machinery at once in the event of any misadjustment or mechanical failure on the part of the carriage. The other switch acts to stop the machinery if the narrowing fingers approach each other so closely as to tear up the needle bed.

Plant engineers in every industry are daily finding more and more uses for MICRO switches as limits, safeties and interlocks to make existing equipment more automatic and more productive.

There is a MICRO authorized distributor located near you with a wide variety of MICRO precision switches from which to select the switches best suited to your equipment needs. Micro engineering service is also available at nearby branch offices to help you solve your switch problems.

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sented with an excellent opportunity to quietly boost his own stock. When this occurs, the foreman should, in a patient and friendly manner, explain to the man why his suggestion does not fit in with, say, existing practice and how, perhaps, the expense of the wholesale shuffle necessary to make it do so would more than swallow up the estimate benefits from the suggestion. If this is done without any attempt by the foreman to crow, and if his case is a good one, carrying conviction, the man's disappointment will be less keen and his opinion of the boss will probably be heightened accordingly.

The foreman who can make a virtue of necessity can often turn a grouse into a pat on the back and use an "incident" as modest propaganda for his own ends. If in his own mind the foreman knows a criticism, even of his activities, to be just and valid, then his course is clear. He should promptly acknowledge the short-coming, thank the critic for his help in the matter and set about finding a remedy without delay. The type of foreman who rudely informs a man with an idea "I'll do all the thinking that is required here. You do the other part," is sadly out of step with modern conception of management and, of course, foremen today have managerial functions.

To rebuff a thinker is merely a short cut to unsatisfactory production and is a sure and certain step toward unpopularity with its attendant evil, worry.

Although an oldtimer who has passed through all the grades, I am soundly convinced of the wisdom of taking normal people with me and of the correctness of appointing shop foremen likely to subscribe to this view. Shop harmony rarely stems from dictation or high-hat methods. Some few may respond agreeably to such treatment but many more will resent it, and so goodbye to the happy shop atmosphere for which all good, level-headed executives strive. We oldtimers were brought up in a hard,

"Wow—all Hell would have broken loose if this would of happened to the girls in the women's locker room—!"

conservative school. Some of us have come round to approve of modern methods of training, selection, and appointment of shop foremen, others have been less fortunate.

I am all for appointing a good type of man as foreman, properly trained and educated in the art of leading rather than driving—one who has been soundly instructed in the art and practice of moderation and toleration. Such a foreman will know that appearances can be very misleading and will defer judgment till all the facts are in his possession. Then and only then will he be in a position to act with confidence and justice to all concerned.

A critical opinion of the foreman by the workmen can be highly instructive and beneficial occasionally; it is good for us, at times, to see ourselves as others see us; it helps to keep our feet on the ground and our heads out of the clouds.

C D Mackinnon
Lanarkshire, Scotland

•

BORROW — OR STEAL?

Should workers be allowed to borrow tools for occasional private use? Will such a policy lead to excess? Will the tool be borrowed anyway, if the request is refused? Readers say . . .

THE PROBLEM AL got on his hands because he put a damper on letting Rogers borrow a pair of pipe wrenches over the weekend serves him right. If Rogers is one of the few building a house, Al should encourage and help him in every way he can, and borrowing a pair of wrenches is not too great a favor.

By that I don't mean that everybody should have the right to take company tools with him when he goes home, but Al should be able to judge each case and accept such requests as he is sure won't be detrimental to the company or to his own responsibility.

But why not ask the manager of the plant for a ruling on the question? I agree with Ed that I cannot see what harm can come by letting a man have the use of some tools now and then to help him out. I think if Rogers gets a permit to borrow the pipe wrenches he'll be quite happy, and this state of mind should increase the production. Yes, why not let him take the electric drill home too? He won't do the drill any harm. Such cooperation will create a goodwill that should be of benefit to any company. A policy of that kind will not lead to excesses, or if it does, it's easy

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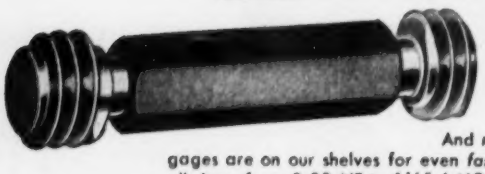

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enough to discontinue the privilege.

Lending a few tools now and then to employees is far better than an arbitrary denial.

Once I needed a 10-ton jackscrew to lift the front end of the outside steps of my house in order to put some concrete underneath, as it had sunk about 5 inches there. By borrowing this jackscrew from my employer and doing the job myself, I saved quite a lot of money. I have also borrowed many other tools occasionally.

The privilege of borrowing a few tools now and then from the employer, I think, should be extended rather than curtailed. On the other hand, I don't accept the theory that a man like Rogers will steal the tools he needs if lending them is denied.

A E Fristedt

Stockholm-Bromma, Sweden

•

WEARING OFF THE GREEN

Will a little extra time spent on breaking in a new man pay off in the long run? Is it better to gain a man's confidence and ease the strangeness of a new job, or should he be left to himself to catch on gradually?

INSTRUCTING A NEW MAN should always pay a handsome return. So I'm not in favor of Ed's argument that in doing so Al is letting down on his regular job—this is part of his duty.

Al's reason for taking on new men is very sound, and should be practiced everywhere. A man far away from his home town will feel all the more satisfied if taken care of at his place of work than if left to clear out things for himself. Talking to a new man might have a wonderful effect on both parties.

Any man starting in a new shop will wonder what kind of a foreman he'll get, and whether he is a man of high character and cunning, whether he is a slave driver, etc. It should be of equal interest to a foreman to find out if the new man is a good craftsman—perhaps with technical education—or whether he is a beginner at the game. A smile and a few encouraging words from the foreman for each new man might work wonders. If a foreman is so loaded with duties that this would take too much of his time, he needs an assistant.

I don't suppose Al is getting tired of supervising his men, as Ed seems to conclude from his word about the duty of keeping an eye on the job all the time was getting monotonous. In any well-organized shop, each man knows his duties so well that the

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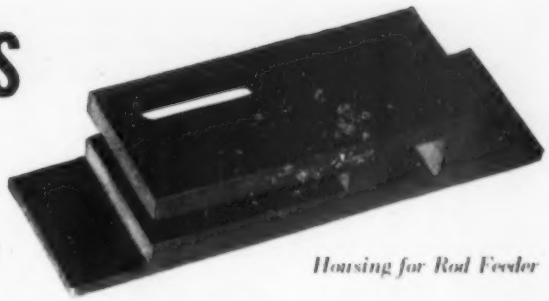

Housing for Rod Feeder

Internal Operating Lever

These two parts—vital to a starting-rod feeder for a hand-scarfing blowpipe—are produced in quantity by HAYNES precision-investment casting. Both parts are too intricate in shape for accurate production by conventional casting methods. And since they are made from stainless steel, the cost of machining the parts in quantity would be prohibitive.

HAYNES precision casting is an ideal method for mass-producing parts that must be made from an alloy difficult to fabricate into intricate shapes by ordinary methods. Sound, smooth castings are produced to such close dimensional standards that the need for finishing operations is minimized. For more information on the types of parts best suited to this process, and for tips on designing parts to be cast by this method, write for the booklet, "Investment Castings."

The efficiency of the starting-rod feeder on this hand-scarfing blowpipe is partly due to the use of HAYNES *investment castings for the critical parts of the assembly.*

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foreman should not have to look after the jobs all the time.

Al is doing the right thing when breaking down the barrier between himself and the new man and making him feel at home. The confidence gained will make the man also feel one with the company. Al should tell him that if he has any new ideas, he is welcome to let him know about them.

Ed must be joking with Al when he tells him he would do better to let the new man catch up gradually and forget about new ideas. Just think how much time is lost if Al followed this advice. And new ideas! Why, they might be worth more than Ed's and Al's efforts combined. If Ed really means what he is saying, he is unfit to be a foreman. If the policy in Ed's shop is what he is recommending to Al, I'm not surprised that he is losing his new men.

Yes, why not spend a little money now, as Al suggests, and give 'em a little attention. It'll pay a good dividend in the long run. No one will blame Al for favoring any new man just because he talks to him. It won't spoil him nor create dissatisfaction among the older employees.

A E Fristedt
Stockholm-Bromma, Sweden

•

THE TIME SPENT with a new employee is never wasted time. If the worker who is selected by the foreman is of the calibre that should become a member of the company organization, then it is the duty and the responsibility of the foreman to properly train and develop him.

Men who come from other shops know how other people live. They have had the opportunity to learn more than one way of doing a job. Most jobs can be accomplished in many ways, but usually some one method is the best and most efficient. Not always is this best way in use in every company. The new worker sees this, and if given an opportunity to suggest changes in methods, can give an idea to the foreman, and the man is certainly worth any effort that has been put forth by the foreman.

Naturally, to make the most out of the acquiring of new employees in a company or in an individual department, the final results rest with the supervisor. Should this man be like Ed, who figures a new guy should look out for himself? If so, then work will be unprogressive and very little good will be gained for many months. Actually in many cases the foreman's attitude represents the employee's attitude and sometimes

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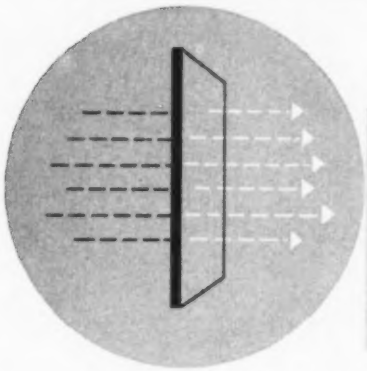

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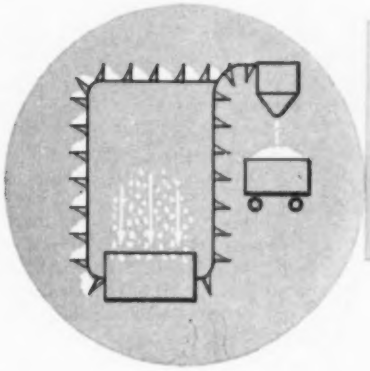

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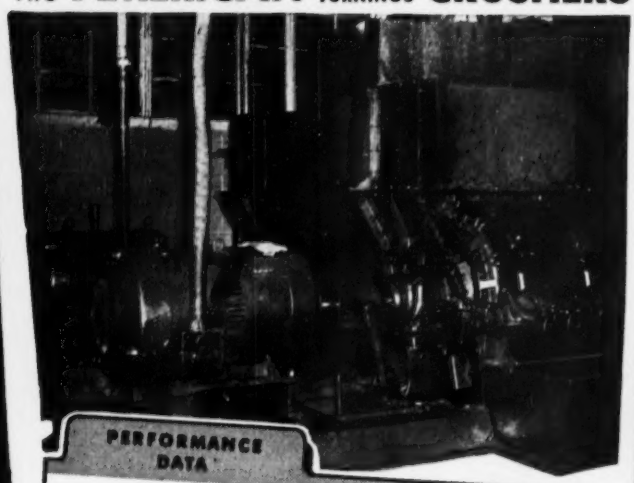

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AVERAGE AGE:	35 months
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prevents the use of new ideas. This is certainly a sorry plight for a company to fall into, but it does happen. When a supervisor takes time to properly indoctrinate his new help, he will be well repaid. They will more quickly become productive and he will in return be recognized by his superiors for doing a good job in getting things accomplished.

Of course we find differences in people who are being hired. Some of these men will never stay with any one company. They are, perhaps, drifters or may be they are individuals who like to see things done properly, but find that the company has problems that it is content to have remain unsolved. Thus the individual is forced to move on or to compromise his ideals. Such a person keeps moving on always in the hope that the next company will wish to produce to the nth degree of finesse and efficiency.

Too often foremen are not aware of the potential in their workers. They are content to live the life of Riley without digging into the human side of the situation to find the hidden gems. Foremen are usually not trained to think along these lines. They are picked first because they know how to do the job, and then because they are the best men immediately available.

Foremanship? Many companies put the man in charge of a group of people and say, "Here—from now on you keep things going—if you don't, you are a poor foreman." No training, no help, no plan. So the foreman struggles along. Some of them become very successful in spite of such handicaps. Others are complete flops.

The mass of foremen in the companies today are average. They could all be good if they were aided in their work. Proper assistance would show them that good per-

"The men never think of lining up until one minute to five."

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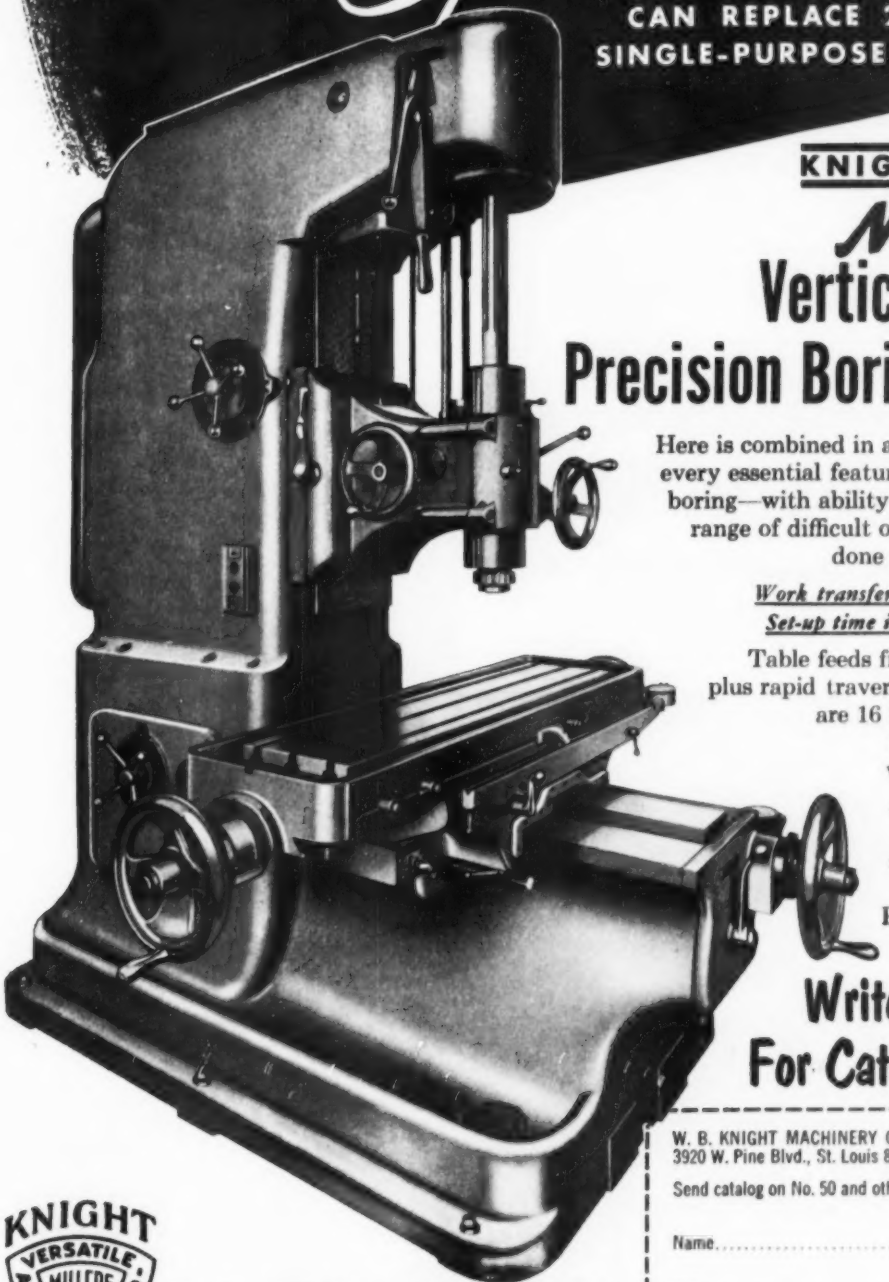

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Here is combined in a single solid-base machine every essential feature for milling and accurate boring—with ability to accomplish an extreme range of difficult or unusual work invariably done on two or more machines.

Work transfers are entirely eliminated
Set-up time is reduced to a minimum

Table feeds from 5/16" to 20" per minute plus rapid traverse in all directions. There are 16 Spindle speeds from 40 to 2000 r.p.m. and infinitely variable boring feeds from .0005" to .010".

Convenient quick-action controls—full-vision work areas—easy operation. Powerful all-gear 7½ H.P. drive—extra-rugged construction.

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Name.....

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☐ Send information on Knight's 20" and 42" Rotary Tables.

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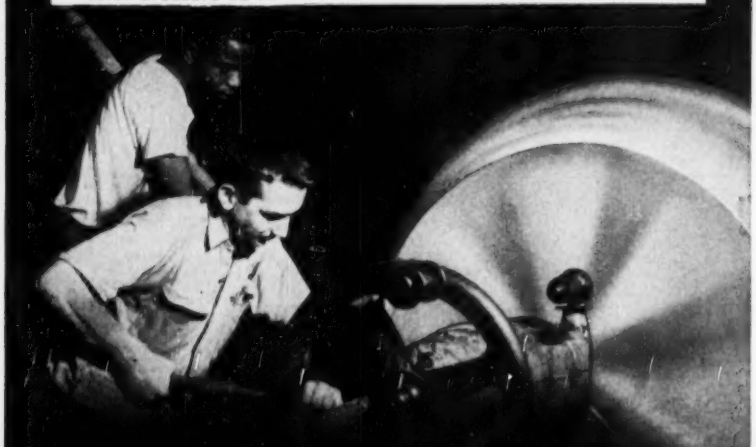

ROLAND TEINER CO. INC. EVERETT MASSACHUSETTS

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sonnel training pays off. It not only eases the tension of all concerned, but it increases production. Supervision of other employees cannot be neglected during training periods for new help but if the department is properly organized, the foreman can be off the job for hours on end without a disruption to his productive force. Training would show the foreman that new ideas must be used to keep the production increasing and to keep the company in business.

Proper training would guide the selection of new employees so that the foreman would know in advance that his new help was of the proper calibre — individuals that would serve the company well.

Time spent on new employees whether they are the lowest paid employees or the highest paid supervisors, will pay off. Unfortunately too few companies practice the Golden Rule. Most are looking for a chance to get all they can from the employees without helping them to become better acquainted with their jobs.

Let's help our employees — let's spend time with them and learn more about how to do the job differently.

Charles D Townsend
West Hartford, Conn

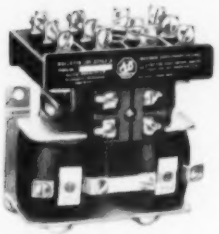
•

A LONG CHAT with the new employee by the works manager or foreman would provide him with a timetable on just what skill he can expect from the new man.

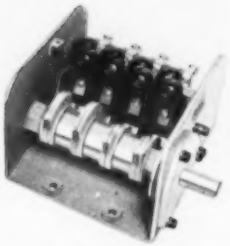
It provides the opportunity to exchange ideas, and encourage new workers to turn in suggestions. It also puts the new man at ease, and he feels that he is of some consequence to company plans.

Through this means a foreman

"I don't suppose your being drafted next week has anything to do with the boss' giving you a raise."

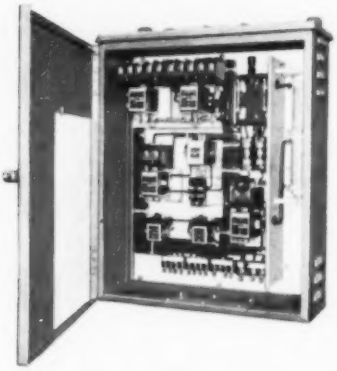


Bulletin 705 Reversing Switch for small a-c and d-c motors

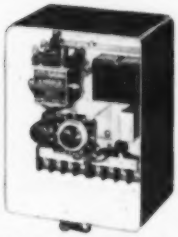


Bulletin 801 Rotating Adjustable Cam Limit Switch. Heavy duty

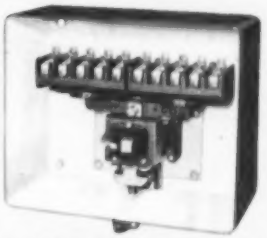
Bulletin 850 Motor Driven Timer for automatic process control



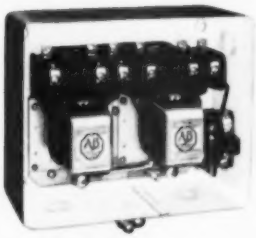
Bulletin 290R D-C Reduced Voltage, Reversing Starter for marine service



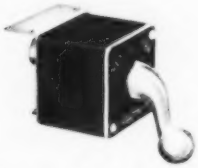
Bulletin 852 Electronic Time Delay Relay for precision timing



Bulletin 704 Nine-pole Permanent Magnet Contactor. Noiseless



Bulletin 205 Size 1 Reversing Switch for direct current motors



Bulletin 350 Drum Switch for reversing small a-c and d-c motors

Bulletin 365 Drum Controller for multispeed a-c motors

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ALLEN-BRADLEY LINE

The standard Allen-Bradley line includes a wide range of solenoid operated across-the-line starters, combination starters, reversing switches, reduced voltage starters, and multispeed controls . . . not to mention an extensive variety of relays, contactors, and accessories.

And that is not all!

It also includes many other useful items . . . a few of which are shown here. They find application in the process industries, in marine service, in laundries, and in many other industries. All are designed for long, trouble free life and built to the widely recognized QUALITY standards that apply to the entire Allen-Bradley line.

If you use motor controls . . . it will pay you to become acquainted with the latest Allen-Bradley Catalog. May we send you a copy?

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MOTOR CONTROL
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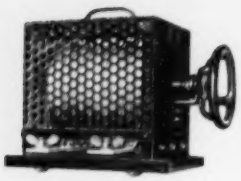
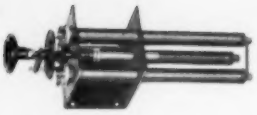


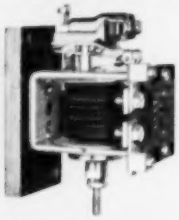
Bulletin 470 Graphite Disc Rheostat for laboratories

Bulletin 500 Knee and Foot Controllers for sewing machines

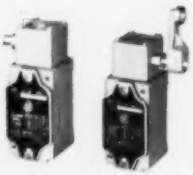
Bulletin 802 Foot Switch for heavy duty, rough service



Bulletin 410 Graphite Disc Rheostat for stepless control



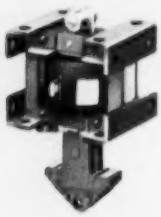
Bulletin 809 Instantaneous Current Jam-type Relay



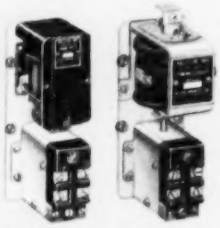
Bulletin 802 Limit Switches with various operating levers

Bulletin 600 Switch with overload breaker and pilot light

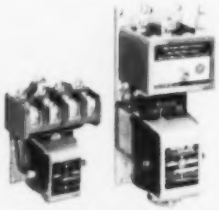
Bulletin 848 Dashpot Timing Relay. Maximum interval 30 sec.



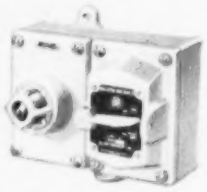
Bulletin 860 A-C Solenoid supplied in variety of ratings



Bulletin 849 Pneumatic Timers for machine tool service



Bulletin 202 D-C Contactors for applications up to 150 amperes

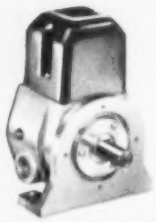


Bulletin 600 Watertight Starting Switch with pilot light

Bulletin 840 Float Switch operated by float and chain

Bulletin 800T Oiltight Push Buttons for machine tools

Bulletin 801 Rocker Arm Limit Switch for reversing service



Bulletin 808 Zero Speed Plugging Switch with magnetic lockout

Popular Accessories

in THE ALLEN-BRADLEY LINE

Look for the A-B trademark. It is a guarantee of Quality

Above are shown a few Allen-Bradley control accessories. The variety of these units reveals the wide scope of the complete Allen-Bradley line. To machinery designers and plant engineers, the Allen-Bradley Catalog is a treasure house of standard control accessories which can be used in innumeruble combinations to solve virtually any control problem. May we send you a copy of this Handy Catalog?

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can find out what the new employee already knows about the job to which he is to be assigned, and the worker in turn can discover just what is expected of him, and the relationship of his job to the finished product.

The new man should be encouraged to ask questions. A general discussion of the job will increase morale and efficiency from the start.

If these methods were followed by men in charge, we would have fewer headaches. If we make it a point to be interested in the new employee, he in turn will be interested in us. Getting along in life is a matter of give and take; it is helping others with ability and good qualities, and a mutual combining of ideas.

A E Salmons
Philadelphia, Pa

•

ADLAI or IKE

How much time should be allowed for shopmen to discuss politics or similar subjects during working hours? Will forbidding such discussions tend to arouse resentment, and indirectly lower morale? Or is it preferable to permit a reasonable exchange of ideas, so long as production is maintained?

POLITICS, LIKE any other subject, should be taken in small doses within the working hours of a company. One cannot entirely stop discussion since that would be a step toward dictatorship, for sure. We do live in a free country, or almost free, in respect to what can or cannot be said. Limitations set on our discussions are actually few, and those that are imposed should be respected. For these limitations have been developed through the years of social gains and are part of our structure and behavior.

Naturally, in the years of high political heat such as we are now experiencing, one wonders a bit about the unwritten laws of how far discussion should be carried. Yet deep within each of us, we know that there is a time and a place for everything, and sometimes to follow our better selves would be best for all.

Now the discussion of the political situation within a plant during working hours has, perhaps, become seriously clouded in the last 15 to 20 years. The strong labor unions and their guiding of people's thinking have caused many to become confused. Yet even in this there may be a good sign. People do at least hear about government and

SAVE HOURS in finishing time

with LIQUAMATTE wet blasting

Tools, dies, molds, engine parts, etc. requiring 1 to 6 hours to finish by hand methods are now finished in from 30 seconds to 10 minutes in a Liquamatte Wet Blasting Machine. It produces finishes mechanically at high speeds that previously have been impossible to achieve except by hand methods.

For example, at the Oling Tool Company a Liquamatte is saving an average of 50% on former time and labor requirements for surfacing tools prior to plating. On some items, such as drill bits, savings as high as 80% have been effected.

these bulletins tell how

send for these bulletins today

Save Time on Tools, Dies, Molds. Bulletin 43

Save Time on Glass Molds Bulletin 53

Save Time on Plastic Molds. Bulletin 63

American LIQUAMATTE
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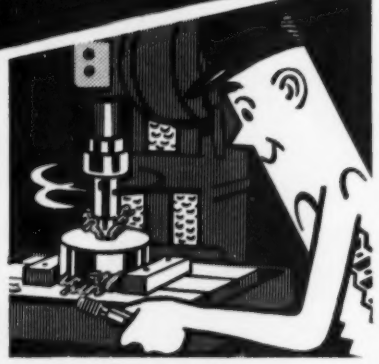
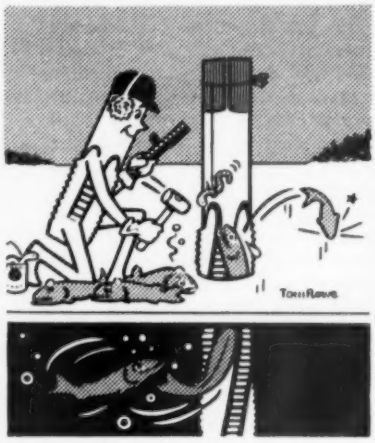
317 S. BYRKIT ST., MISHAWAKA, INDIANA

TAP-ODDITIES



Pete sez — "Bath Taps will never clog —
The flutes are deep and slick.
You never have to "fish for chips" —
They slide out mighty quick."
Although his eye is very keen,
Pete is a wise old sage.
He checks the measure of his work
With a Bath "go" — "no go" gage!



Pete dreamed up a shiny tap
To cut holes in the ice.
Instead of chips, when fish slide out
He "bops 'em" once or twice.
Although his eye is very keen,
Pete is a wise old sage.
He checks the measure of his catch
With a sportsmans "no go" gage!

Bath ground thread taps are designed with deep, polished flutes, so that chips from the work will slide, instead of pile up. This important feature eliminates clogging and tap breakage. Expert grinding and polishing of the flutes also assures a refined cutting edge all the way to the crests of the teeth.

No matter how accurate the tools or how experienced the craftsmen — guesswork has no place in today's precise requirements.

Bath Internal Micrometers, Plug Thread and Ring Thread Gages are made with one thought in mind — *lasting accuracy.* High speed steel, ground from the solid after hardening, lapped to a high finish — leaves a smooth, hard surface that guarantees a minimum of Bath Gage wear — a maximum of precision. Bath products are engineered for those who want to be *sure!*

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS — PERFORMANCE

JOHN BATH CO. INC. · WORCESTER · MASS

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

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22 Grafton St., Worcester, Mass.

the ones running it, even if it is one-sided viewpoint that they hear. More people take interest in the political affairs of the country, of the state, and of their own city or town than ever before.

It is too bad that industries do not properly organize in order to bring to their employees through the medium of plant bulletins, a shop paper or meetings, the clear facts about both sides. The old-fashioned debate was, perhaps, one of the reasons that more people knew about how both candidates stacked up against each other in the old days. Now we resort to "whistle stops" and a "whip up" of mass thinking and high emotions, first over one man and then over another. There is no chance to make a side-by-side comparison.

If the workers within a company can keep the discussion of politics to a point where no slowdown in production is to be had, then there is no problem. Usually however, the discussion becomes involved and fifteen or twenty minutes fly by as if they were only one minute. This is the reason that the company dislikes to have discussions of any kind carried on. Production is the life-blood of the company and its workers. Too often this point is not properly gotten across to the worker. The worker feels that he just works for the day's pay but never thinks beyond that point. He forgets that no production or production obtained at a high cost means he will some day be out of a job.

The foreman has his responsibility in this respect also. It is up to him to see that there is no discussion

"Mrs Jones picked out our 1953 calendars."

RE-ORDERS

PROVE THE VALUE OF

Sibley's Model C-20 Drilling Machines!

Nothing demonstrates customer satisfaction more than repeat business—and judging from the repeat orders for the Model C-20, customers have found it to be a real cost and time saving investment.

On the market now for two years, this 20" swing machine has been tested in toolrooms and on production in hundreds of plants—and customers acclaim it as the finest drilling machine for its capacity they've ever operated.

There are good reasons for this acceptance! Operation is so effortless—geared power feeds are selected by turning a knob; spindle speeds range from 65 to 1360 R.P.M.; its capacity of 1¼" in mild steel handles a large variety of drilling jobs.

2 TO 3 WEEKS DELIVERY!
No lengthy waiting for your order.

OTHER SIBLEY MODELS
Model E-25 medium weight with 25" swing and ¾" capacity in mild steel. Heavier Models D-24 and D-28 in 24" or 28" swing with 1¾" capacity.

Don't Delay —write for specifications today!

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SIBLEY MACHINE & FOUNDRY CORP.
60 E. Tutt St., South Bend 23, Indiana
Send Catalog No. 67
Name _____ Title _____
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$$ TREASURE $$ IN YOUR SCRAP PILE

HARD CHROMIUM PLATING can salvage machine parts. Worn bearings, scored shafts, flat surfaces—plating .100" thick has been successfully applied. Shorter down time; a harder, more perfect anti-friction bearing than on original equipment.

Send a sketch of your problem, and we will advise you as to the possibility of using HARD CHROMIUM PLATING as a method of salvage.

SMART DESIGNERS IN BOTH GOVERNMENT AND PRIVATE INDUSTRY ARE USING HARD CHROMIUM PLATING AS A SURFACE FINISH IN NEW DESIGNS.

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NEW Dial Bore Gages
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perfect visual control at machine as well as at inspection . . .
Available from smallest model checking .090" bore to largest checking 48 inch bore.
Speed up production; reduce scrap; save time; save $$$$.
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where and when discussion is prohibited or where it will hurt the department's productivity. If he is well schooled in foremanship, he knows how to get the boys back on the job. He knows how to stop the time-wasting gossip—which is just as bad if not worse, than politics.

This problem is not a situation which comes up only in election years. It is a foreman's problem each day of the year and should be handled the same way as any other problem when men spend too much time talking together.

Big political rallies and discussions must be held away from company premises unless the affair is company-sponsored. Naturally, the property of an industrial concern is for the production of the company product and not a place to debate the pros and cons of politics or any other subject. Discussions in small doses can be taken, but large work stoppages can not be tolerated.

Charles D Townsend
West Hartford, Conn

•

ALREADY THE SUBJECT of political discussions has hit many manufacturing plants, in one of which a number of pasteboard signs have appeared bearing the words, "No political discussions during working hours," and it has had a well-noted effect on the employees.

A foreman reports that there were hot words in some cases which could very easily have ended in free-for-all fights, but the signs have proved to be great promoters of Christianity.

Many men who work in plants are sufficiently conscientious and on the square to avoid using the time of their employers for personal discussions of any and all kinds.

There is no difference in discussions as far as wasted time is concerned, but what man is there who doesn't want to tell the latest joke he has heard to a neighboring workmate or elucidate upon the latest story which has been told to him, sometimes off-color?

If an operator is going to leave his machine for a single minute, he should shut it down; if he doesn't, it may mean trouble. But, if he remains at his machine, he should keep both himself and the machine going at a maximum rate of productive effort.

Absence from his place of work may apply to the time needed to get a drink, or to attend to a call of nature or other required duty.

Another cause of delays is carelessness upon the part of employees, as in the case back in the days when belts were shifted by hand on cone

pulleys. An apprentice shifted a belt, then hung the pole almost alongside the belt. Vibration caused the pole to drop so that it lit on the belt and then it travelled to the line shaft, ripped the lacing off the belt, and then became wound around the shaft and pieces of the pole were thrown in several directions and hit two men and a fight was on.

This cost the company three hours of combined time and a cop broke up the scrap on the shop floor.

In the shop, the foreman represents the firm and must keep his men busy; he must see to it that the raw stock is kept coming into his department and that finished articles are promptly going out; he must see to it and know that the machinery and equipment in his care is kept in first-class working condition and at all times these should be up to their productive capacity. Above all, he must have that great human talent known as diplomacy in order to quietly keep all hands agreeable to each other under their working conditions. No idleness should be condoned because of personal matters.

F H Stebbins
Worcester, NY

•

THE OLD SAYING comes up again: "All work and no play makes Josh a dull boy." This brings up the subject of whether we are running a business or sports event? There is a time and place for both.

For instance, a man is working a job which must be finished at a certain time when a fellow worker approaches him on a subject pertaining to some form of sports or politics. The worker's mind is taken away from his job; he is liable to make a mistake, spoiling the job and delay-

"I don't know who he is—but he certainly has some new wrinkles in chip control!"

SIX SPINDLE
PRE-SELECTIVE SPINDLE SPEEDS
TURRET TYPE AUTOMATIC INDEXING
DRILLING AND TAPPING MACHINE
. . gives you 6 MACHINES IN ONE

THE NEW No. 2 MODEL A
Burgmaster

Designed for . . .
HIGHER PRODUCTION WITH GREATER ACCURACY AT LOWER COST PER PIECE MACHINED

The No. 2 Model A BURGMASTER will definitely cut your second operation costs because: Loss of time due to movements of parts from one spindle to another are eliminated; Close tolerances on size and concentricity are easily maintained; Set-up is simple and fast — unskilled operators can run the machine; Less floor space and power required; Rigidity, power and spindle speeds permit the use of high cutting speeds.

New equipped with Warner electric clutch units in speed change mechanism.

- ¾" Drill Capacity
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- 1 to 2 H.P., 2 speed, 3 phase, 60 cycle Motor
- 12 Spindle Speeds, ranging from 225-3000 R.P.M.
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- Power Index, utilizing Geneva Mechanism
- Individual Depth Stops
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- Table work surface—17"x33"
- Approximate weight--1650 lbs.
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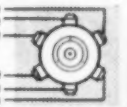
- Extremely close tolerance can be held



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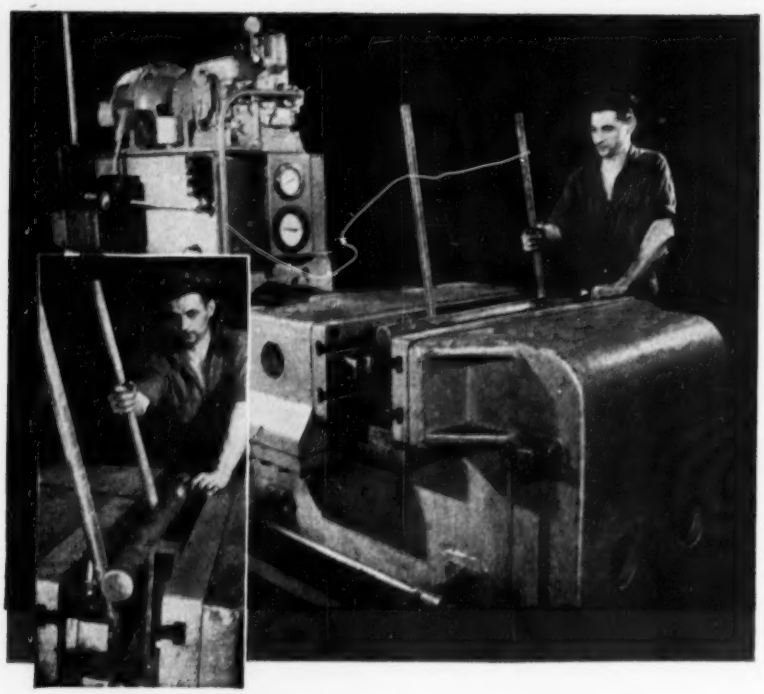

Mercury Mfg. Co. does a better job twice as fast with a

FARQUHAR Hydraulic Press

Mercury Manufacturing Co., Chicago, Ill., producers of fork trucks, tractors and trailers, uses a 200-Ton Farquhar Horizontal Bulldozer press to make forgings and stampings and to form plates. In operation 8 hours a day, the press does most jobs twice as fast as the mechanical bulldozer used formerly, and better speed control produces better work.

In addition, many pieces of work that used to be farmed out are now done at Mercury—providing better production and quality control, and effecting additional savings of time.

In the operation shown above, high carbon brazed steel is bent quickly and accurately. In other operations, the press forms heads on bolts, legs for caster forms, and bends structural T frames.

Mercury reports very small maintenance costs, and sums up the company's satisfaction with, "It's the best!"

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Just one more example of cost-cutting Farquhar performance in heavy production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for Free Catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: A. B. FARQUHAR CO., *Hydraulic Press Dept.*, 1506 Duke St., York, Pa.

—A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION—

ing possibly a crew of men depending upon that particular part.

Another side to take into consideration is a steady worker who is not interested in sports. He may say to his foreman, "I should get more money than those fellows who stand there talking. They waste a lot of time, while I get more work done." A good argument, and the man is perfectly right.

We have recently been through a siege of baseballitis, shall we call it, and are now in the midst of politics. Who can say production rating was normal instead of declining during that period?

Let us look back or enlighten Ed of conditions as they were in the past when men worked sometimes nine and ten hours a day six days a week. This alone proves a point when we find ourselves working only seven or eight hours a day with only five days a week, dividing our twenty-four hours a day into eight hours for work, eight hours for pleasure and eight hours for sleep.

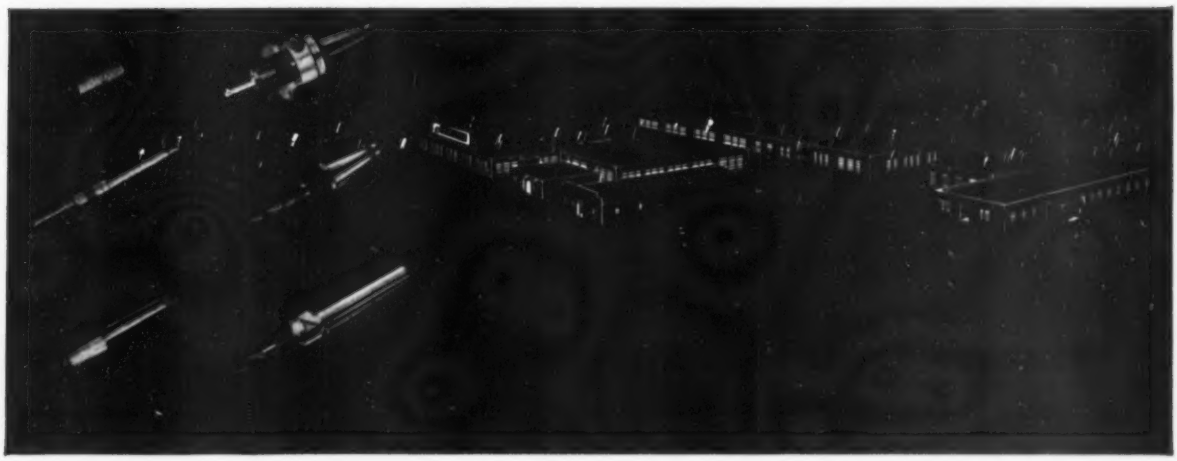
Most plants today allow a period in the forenoon and afternoon for relaxation, so let's talk about sports and politics during these periods and both sides will be happier.

In small plants or jobbing shops where estimates are given for work being done, these talks should not take place during working hours, as it can overthrow the schedule and we find ourselves carrying work over to the next day which should have been finished.

Ed claims it is permissible for men to get together in a plant during working hours and discuss sports, etc. How many of these same men discuss business while at a sports event? So, with all fairness we must take into consideration both sides of

"That machine's got eight speeds, Haggerty, while you've only got one . . . and that's SLOW!"

Check these features that make Universal drill bushings outstanding: 1. Super finish reduces wear to a minimum. 2. Blended radius reduces tool hang up. 3. 100% concentricity and hardness tests assure accuracy. 4. Knurled head provides quick sure grip. Order from the office nearest you ... 1060 Broad St., Newark, N.J., 5035 Sixth Ave., Kenosha, Wis., or write direct to our home office.



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"DIE-LESS DUPLICATING" SAVES TOOLING COSTS, SPEEDS PRODUCTION

Di-Acro (pronounced Die-ack-ro) is the registered brand name for DI-ACRO Brakes, Notchers, Punch Presses, Rod Parters, Rollers, Shears, Benders.

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PRECISION METALWORKING MACHINES

Shows many photos of "Die-Less Duplicating" forming technique with Di-Acro Machines. Features 36 hand and power models in quick reference tables. Explains free Di-Acro Engineering Service. Write for your copy now.

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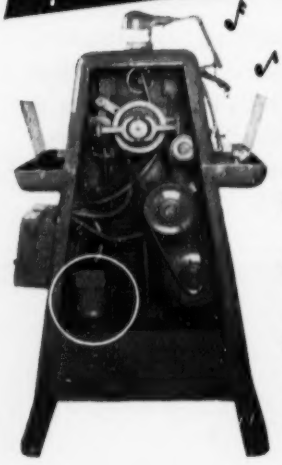
in your cutting operations with your

RUTHMAN GUSHER COOLANT PUMPS



Your Gusher gives you—

1 ECONOMY—Uses less power when throttled—requires less attention—

2 LONG LIFE—Simple design—electronically balanced rotating parts—precision construction, assures long life.

3 EFFICIENCY—Responds instantly with copious coolant flow.

For a better coolant pump specify Gusher Pumps on your metal cutting machine.

This Superior Honing Machine is equipped with a Ruthman Gusher Pump—Follow the leader; specify Ruthman on your machine.

THE RUTHMAN MACHINERY CO.
1818 Reading Road, Cincinnati, Ohio

the picture and say while at a sports event enjoy it, while at work do your job.

C W McLarty
Woodhaven, NY

•

CAN A MAN STEP DOWN?

Is it a reflection on the foreman when a man he has picked for his assistant must be demoted? Will he be blamed for his initial poor judgment? Will the worker be more likely to resent the demotion, or realize that he was not yet quite ready for the job? Readers' opinions vary . . .

AL'S MISTAKE was not in selecting Bingham for an assistant, but in having any assistant at all.

In the fine old New England shop where I first learned to manufacture chips, the foreman of a floor divided responsibility with no assistant, although a dozen or more foremen might each be in charge of a subdivision of the manufacturing activities performed on that floor. One of those foremen was designated as "The Second Hand" and he assumed the duties of the general foreman automatically in case of his sickness, or absence for other reason, but otherwise functioned no differently than any other foreman, and never acted as an assistant generally. It was a pretty good practice, and designation of a different foreman as "second hand" at any time occasioned little comment and it frequently happened.

When acting as a substitute for the general foreman, the second hand was not relieved from supervising in usual detail the activities of his own subdivision of the floor, nor did he interfere with the foreman of any other subdivision. He was simply an authority to whom emergency matters could be taken by other foremen only in the absence of the general foreman. He could represent the latter in dealings with other departments, or the main office until his return.

Bingham would not have gotten a swelled head and started "working his crowbar" if he was Al's second hand instead of a formal assistant, nor would the higher-ups have been concerned about Al's various selections of second hands from time to time, and Al would risk losing neither face nor neck.

Any time a foreman's load becomes more than one man can carry well, his activities should be subdivided rather than his responsibilities.

When a foreman has an assistant,

The Standard Scales

incorporated in all SIP Jig Boring and Milling Machines are graduated with the same technique as the fundamental line standards supplied by the Société Genevoise to Bureaux of Standards of all the world. They constitute a metrological basis of unsurpassed and permanent accuracy on which all coordinate measurements are made.

The No. 2P

High Precision Jig Borer

SIP

comprises two standard scales at right angles to each other built into the cross-slides of the work-table. The graduations of the scales are viewed at a large magnification on

projection screens

grouped conveniently on the front of the machine and provided with adjustable setting indexes controlled by micrometer drums permitting coordinate values to be read to .0001 in.

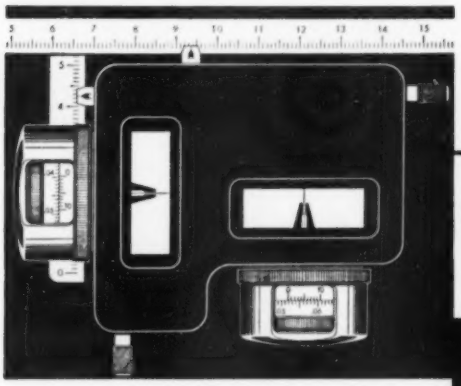
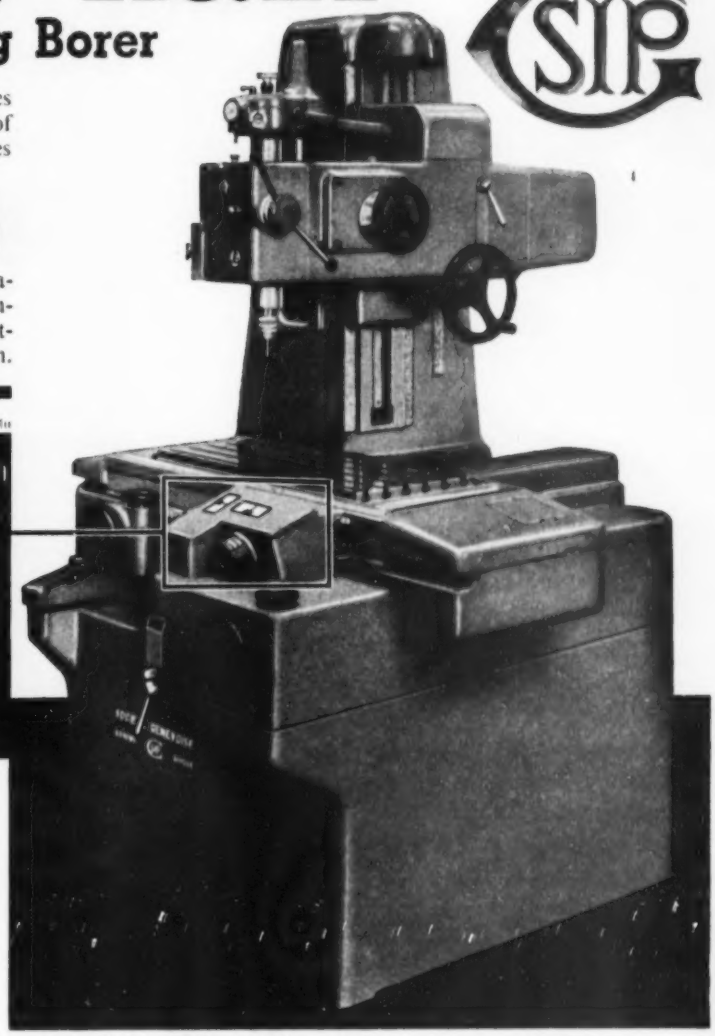


Table setting devices



SPECIFICATION

Working range	16" × 10"
Table working surface	27 1/2" × 12 1/2"
Table top to spindle end	19"
From spindle axis to column	13 3/16"
Spindle speeds	200 to 3000 rpm.
Boring capacity	1 9/16"
Spindle quill travel	5"
Net weight	3,750 lbs.

Guaranteed accuracy for all table settings: .0001 in.

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Samuel Clemens adopted his pen name from the expression used by Mississippi River Pilots, such as he, indicating the 2 Fathom Marking Device affixed to their lead lines.

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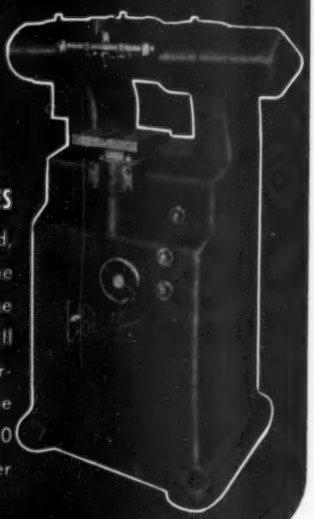
are Designed for
ALL MARKING PURPOSES

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC STAMP COMPANY stands ready to supply or design and build to meet your needs.



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Compact, self-contained, manifold mounted. One control gives full range of marking depth. It will mark round, flat and irregular surfaces. Machine capacity is up to 110 one inch impressions per minute.

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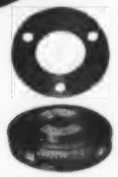
Assuring the utmost in accuracy—used in marking machines, lathes and screw machines.

PUNCH PRESS DIE
Faithfully reproduces and is particularly adapted to large production marking.



ROLL TYPE HOLDER
Depending on requirements, can be had for either solid or interchangeable type.

CADILLAC STAMP CO.
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either of two things happens. He may sit back and let his assistant run the job, with the result that he soon gets out of touch with it himself, and this is the usual thing if he is a square shooter and wants to give the assistant a chance. If he is not that sort of fellow, he will use the assistant for a sort of glorified cross between a scapegoat and an errand-boy and all the assistant will have is grief and a title.

But if the mistake has been made of appointing an assistant he can step down very nicely if Al handles it right. It is no disgrace for an assistant to go back to his old job if the new job is discontinued.

Nearly fifty years ago I superintended a considerable shop where there were five principal subdivisions of the machine shop.

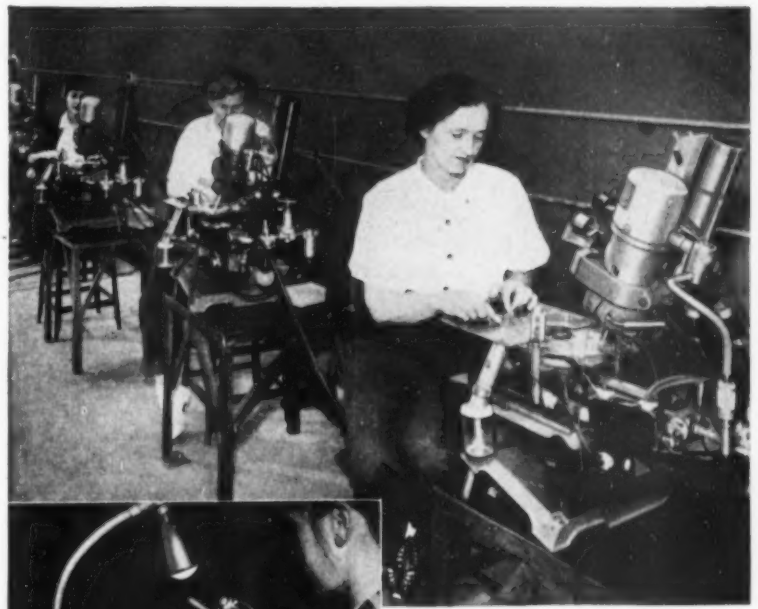
One subdivision was highly specialized and turned out components, each of which was complete in itself, for delivery to other subdivisions, or the shipping department. There were a large number of individual orders in that particular section, and the operations were so simple, and many so short, that a highly qualified clerk would be better as a foreman than an equally well-qualified machinist. The foreman was driven to distraction by the job and making a failure of it.

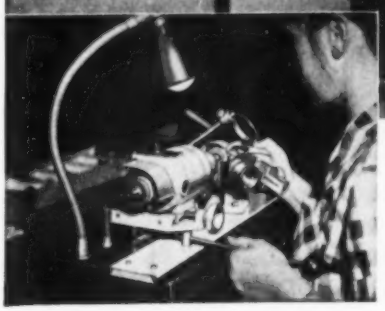
He had been promoted to foreman because he was the best machinist in the department, where he had been running a sixteen-foot vertical boring mill for years.

Handymen and machinists in the department ranged in hourly wages from twenty-two to forty cents an hour for a sixty-hour week. The foreman received thirty dollars a week and no overtime, although he worked plenty of it.

So I concluded to step this foreman down, put him back on the sixteen-foot mill at fifty-nine cents an hour, eighteen per cent over his weekly rate as foreman, and pro-

124,800 holes per day! ... using six DUMORE Automatic Drill Heads





Parts are hand loaded in an automatic indexing rotary table with 24 stations. Peak production has reached 23,000 pieces.

A Dumore Precision Drill Grinder is used to sharpen drills after a full day's production. Maximum drill life per grind has reached 23,000 holes.

Get amazing cost-reducing benefits with DUMORE tools

TALK about amazing production! One west-coast manufacturer uses six *continuous running* Dumore Automatic Drill Heads to drill tiny brass parts — at the rate of *20,800 per head per day*. The job calls for a No. 71 drill (dia. .026") and hole depth of .069". In addition to the amazingly high production, the user reports that the Dumore Automatic Drill Heads slash costs of drill breakage, down-time and scrap loss.

Amazing, too, are the results this company achieves using a Dumore Precision Drill Grinder to sharpen their drills for this job. They actually get a maximum of up to 23,000 holes per sharpening. That means a full day of continuous production for every Dumore sharpened drill, *without stopping to regrind.*

Get all the information about these tools — their capacity to increase small hole production — to eliminate operator guesswork — to provide completely automatic control. Ask your nearby industrial distributor for a demonstration, or write:

THE DUMORE COMPANY
1337 Seventeenth Street • Racine, Wisconsin

"HERE'S WHY I BOUGHT LUFKIN INSIDE MICROMETERS"

EASIEST TO USE—The tubular steel measuring rods are lightweight and easy to handle. Rods can be added to both ends of the micrometer head, which means you can keep the head centrally balanced for most sensitive feel. You can put exactly the tension you want on the threads with the tension screw nut. Larger sizes have lock nut that holds the measurement. There is a complete line available, covering a range of from 1½ to 40 inches. Also available for metric measuring.

EASIEST TO READ—Markings are easy-to-read in either bright or poor light because of the non-glare Chrome-Clad satin finish on the head. Accurate and more rapid readings because each thousandth is numbered. Because the measuring rods can be added to either end of the micrometer head you can keep the head in line of vision and get more precise readings.

EASIEST TO ADJUST—The end caps are hardened to prevent wear, and the micrometer threads hardened and ground to maintain accuracy. Should adjustments be needed they are simple to make. The head is easily adjusted with the wrench which is provided. The rods are quickly adjusted by merely turning the hardened and ground plug at one end.

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moted a rather poor machinist, but very intelligent clerk, to foreman at twenty dollars a week, which was a trifle over his thirty-three cents an hour rate. Everyone was happy and orders commenced to be turned out on time and in an orderly manner; the output of the sixteen-foot mill increased about fifty percent with what was probably the best vertical boring mill man I have ever seen running it.

Lucien I Yeomans
Chicago, Ill.

•

THE MAN WHO FELL down the elevator shaft, brushed himself off quickly, and then let out an indignant complaint, "Damn it all; I said up!" should have taken into consideration that he had made a misstep.

This can equally apply to the man who suddenly finds himself threatened with a lower position because of an act of disloyalty or possible ineptitude for the job given him. In resorting to the crowbar act—trying to wedge himself in during his superior's absence—the man fell down on the job. No matter how he is in all the other requirements, if he is disloyal he can't be depended upon, and certainly should have the props knocked from under him.

While I have had no experience along this line, I shouldn't think that it was the easiest thing in the world to step down to a lower position. I'd much rather choose the front door and get me another job where I'd be happier, no matter how lowly the work. There is no doubt about it that the "backerupper" would have to take a lot of kidding from the fellows, and to my way of thinking, the guy would have to have a goodly supply of case-hardened guts in order to weather it.

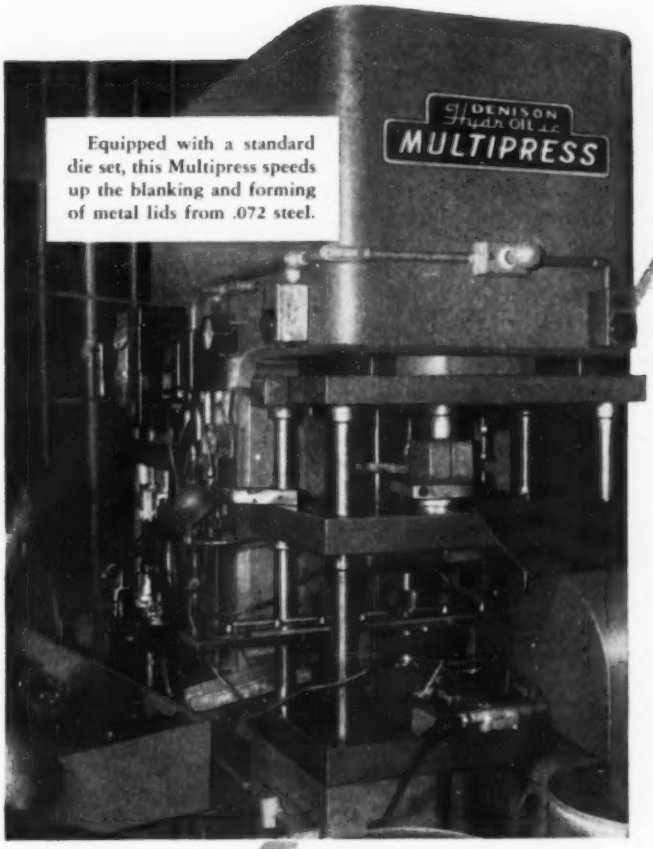
If the man can realize his mistake and is honest with his boss about the cause of the demotion, he should be big enough to accept the inevitable and go back into second gear and be happy—razzing notwithstanding. He may be actuated by pride, refuse to take his medicine, and step out entirely. This is actually the best thing for everybody, unless he happens to be one of those rare individuals who appears once in a blue moon and admits that he was in the wrong.

If, as Al says, the guy resorted to horning-in tactics during his absence, and grudgingly acquiesced in being put back on his old job, there is the possibility that he will con-

"Blanking and Forming

with

MULTIPRESS"®



Equipped with a standard die set, this Multipress speeds up the blanking and forming of metal lids from .072 steel.

Multipress offers *lower* impact on dies . . . *lower* ram velocities.

Exact control of press tonnage cuts die wear, permits more grinds per die.

Infinitely adjustable ram stroke, plus easy inching action permits quicker die changes.

Fully adjustable tonnage, ram speed, and stroke length adaptable to a wider range of work.

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Standard Multipress accessories available for many specialized production needs.

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Denison's newest film, "Blanking & Forming with Multipress" brings you 10 minutes of fast action on several actual production jobs . . . shows the *how* and *why* of methods and principles . . . highlights important press control features — *and gives you a close look at the fastest hydraulic press operation you've ever seen.* Your Denison Multipress representative can show you this new 16mm sound film now, or you may write direct to —

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quality chuck . . .

The makers of Supreme brand Chucks are experienced manufacturers of precision mechanical assemblies with an enviable reputation for skill and craftsmanship. This know-how plus the most modern manufacturing equipment gives a chuck that can truthfully be called a quality product. The Supreme Chuck is engineered to give accurate precise performance and stand up under hard steady usage on the job.

You can buy a Supreme brand Chuck with the confidence that you are getting a "top" quality product.

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SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

tinue to be a thorn in the side of the foreman until the offender's blood pressure returns to normal —if it ever will under the circumstances. Would it not be better for all concerned if he insisted on the elimination of the troublemaker from the organization altogether?

I do not see where it is any reflection on a man's ability to choose an assistant when the one he has picked changes color over-night. The picking of an assistant calls for the utmost care in order that the right man be put on the job. Even then you can't tell how he will turn out under pressure. It is a gamble at all times because a man may display some qualities on one job and then, when put on another, something unforseen comes to the surface and he becomes a different individual. Let's remedy the situation at the source and take a little more time in establishing a man permanently. Seems to me that it is a mistake not to have a period of probation wherein the person is put on trial for a period of time sufficient to assure the foreman that he has made the right choice.

J Homewood
Ontario, Calif

•

"To ERR IS human," is an old saw which seems to somewhat apply to Al in his present dilemma.

There are many times where a demotion is necessary and there are ways to accomplish this which do not compromise either the firm or the employee.

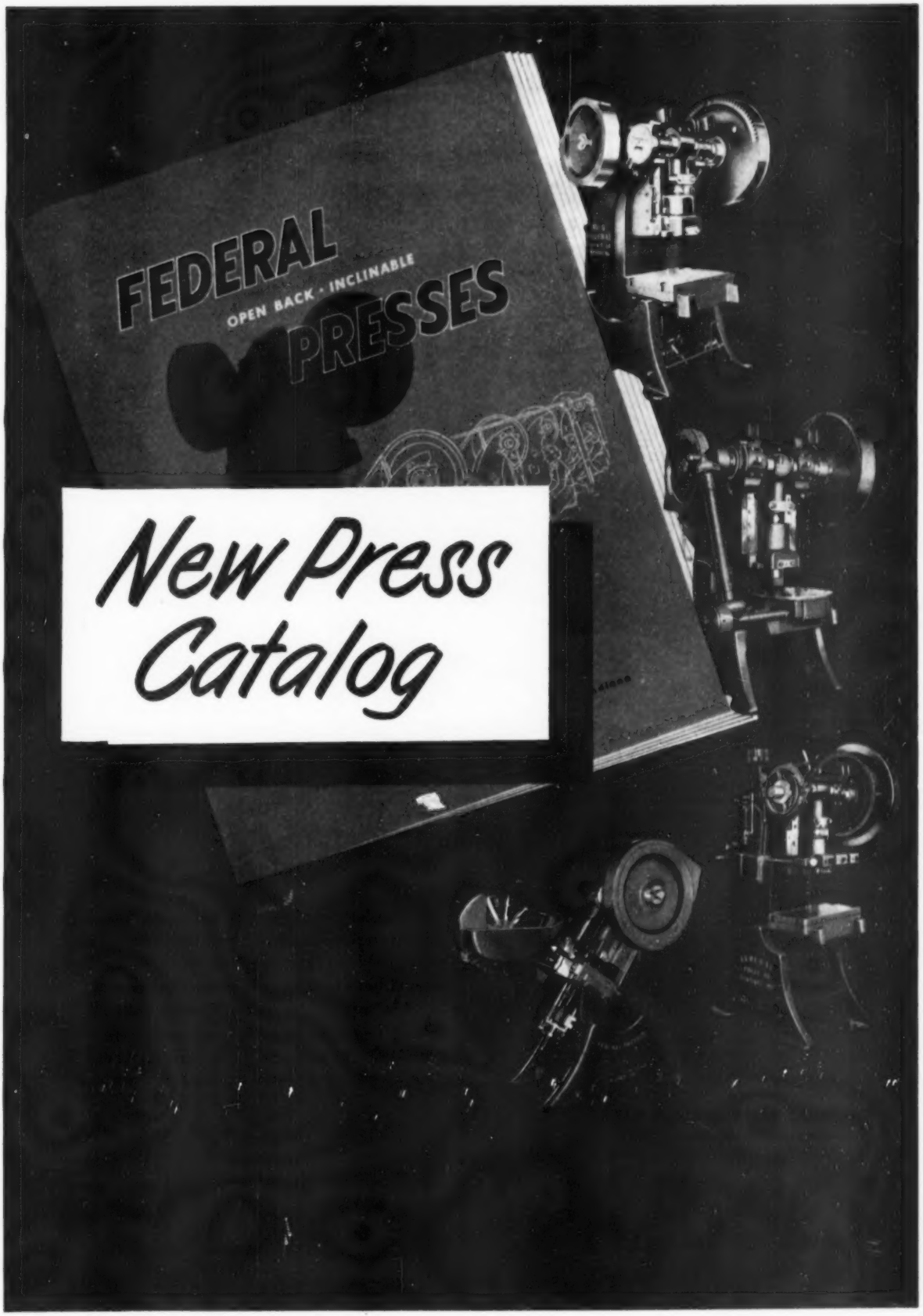
What happens to a man when he is demoted? In many plants this is done and nobody thinks anything of it, but in a modern plant many times such a subject becomes a quandary which is hard to solve. However, under the fair judgment of level heads he is properly rated, while, by having to be demoted, he proves that he is unfit for the job.

The motto is, or should be, progress for every manufacturer, and the motto of every workman should be the same in order to fit himself for promotion or any type of advancement.

Under whatever force men are working, they are of service to the company only when they are willing to give cooperation to the best interests of the firm and their entire attention to the work itself.

Only a genius has the right to work alone, and there are not many men of genius calibre who turn up for work in the average production plant today.

It is not a question of poor judg-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PRESSES
New Press
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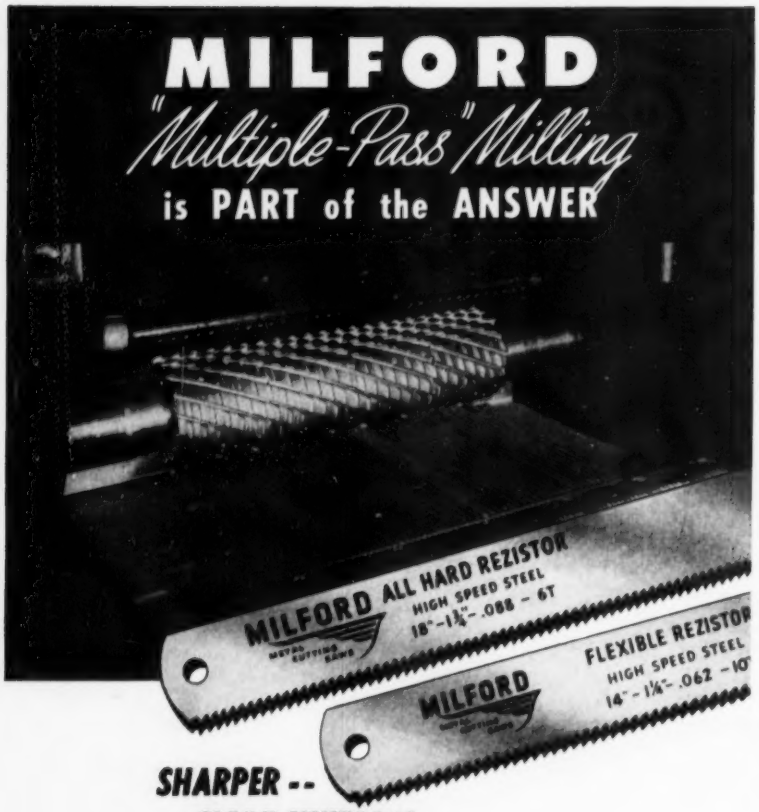

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Milled by multiple passes of the cutters, keener, more uniform teeth are produced, absolutely necessary for faster, smoother cutting of metals. The final burnishing pass produces the smoothly finished teeth, which assure fast, effective chip removal.

ALL MILFORD POWER HACK SAW BLADES . . . give you faster cutting with teeth that are sharp, and stay sharp longer.

STANDARD OF QUALITY THE WORLD OVER

THE HENRY G. THOMPSON & SON CO.

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PROFILE BLADES AND BAND SAW BLADES

HAND AND POWER HACK SAW BLADES

MILFORD

Sold through MILFORD Distributors who render a service tailored to your needs. The industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service, as near as your telephone.

ment upon the part of a foreman who seeks to promote another man or woman, and the latter proves to be incapable of doing the duties which the position demands.

Neither Al nor any other foreman can know beforehand what Bingham or another man will do when he is seriously attempting to undermine his superior.

To try to dig one's self into power at the expense of another is to lose, entirely, the goodwill factor of most of the crowd, and many a man has regretted that he did not give his honorable cooperation. The sooner such men are dismissed the better, but with Bingham it appears to be somewhat different.

Today competition of all kinds among men is ever present, even among mechanics with the best of goodwill, and such is handled in a manner which is civilized; no man has to be brow-beaten in any modern production plant.

Neither is a man subject to such treatment who is chosen to direct the efforts of others, if he knows the meaning of loyalty to his employers yet can keep his dignity when dealing with the men in his department of the organization.

On the other hand, he cannot forget his obligation to his men, for, today these same men are well-educated and well-paid.

Al may have a quiet and confidential discussion with Bingham and caution him to watch his step, but if the latter will not heed the talk which has been between them, his name should be cancelled from the roll of employees.

Of course, Bingham may become obstinate or he may flare up and quit; here again, Al may be able to diplomatically appease him without losing his aplomb, and return him to his or another department after which all may be well.

At this point, Al shows a lack of the best sense when he mentions

that the other men may razz Bingham. The day when razzing was popular has left only a shadow of its past. Men of our times have given such actions the go-by, and today, many times, their words are those of friendship and the expressions are of regret.

None of us can be there to see how Al handles the situation, but it is believed that he will come out a winner.

F H Stebbins
Worcester, NY

NEW BOOKS

THE EMPLOYMENT INTERVIEW IN INDUSTRY—*By Newell C Kephart, associate professor of Industrial Psychology, Purdue University. Published by the McGraw-Hill Book Co, Inc, 330 W 42nd St, New York 36, NY. 277 pages, 6 by 9 in. Price $4.50.*

Because of the importance of interviews in employment procedure, this book treats the problem in the light of newer developments in the field of personal psychology. The author emphasizes the fact that knowledge about the applicant and the job are collected from all sources as well as from the interview itself and then integrated to lead to the final decision. Final hiring is based solely on facts which can be observed and verified.

Recent advances in personnel selection procedures and personnel testing, as they apply to the problem of interviewing, are covered. Topics designed to improve the interview include personnel data, physical data and job analysis.

•

INDUSTRIAL WASTE TREATMENT—*By Edmund B Besselievre, chief sanitary engineer, International Sales, The Dorr Co. Published by the McGraw-Hill Book Co, Inc, 330 W 42nd St, New York 36, NY. 391 pages, 5 by 9 in. Price $7.*

Some of the important questions arising from industrial-waste problems are answered in this book. The questions of who starts a waste-treatment problem, whether an engineer or a specialist should be consulted, how wastes are analyzed and treated, and others are answered.

Extensive bibliographies are supplied at the end of each chapter, thus giving the reader sources of reference and further information.

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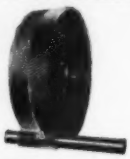

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Federal and State laws concerning the treatment of industrial wastes are outlined in an appendix.

Besides being a guide to plant engineers, consulting engineers and others involved in the waste problem, the book serves as a reference work for students who may wish to enter this branch of sanitary engineering.

•

MECHANICAL WORLD YEAR BOOK 1953 —*Published by Emmott & Co, Ltd, 31 King Street West, Manchester 3, England. 268 pages. Price 3 shillings, 6 pence.*

This new edition of an old-established handbook, now in its 66th year of publication, contains an interesting new section on the design of springs written by a noted British authority, Dr W R Berry. Detail revision of the remainder of the book has been carried on, as usual. Because of the growing number of new subjects that must be introduced each year, it is impossible to keep merely adding to the original volume, and certain subjects must be dropped with each new edition. Earlier editions of the book, therefore, should not be destroyed when the latest one is placed on the shelf.

•

HOW TO IMPROVE THE UTILIZATION OF ENGINEERING MANPOWER — *Prepared by The National Society of Professional Engineers, 1121 Fifteenth St, NW, Washington 5, DC, under direction of the Professional Engineers Conference Board for Industry. 52 pages, 6x9 in. Price $2.00*

This is a guide book for executives in organizations employing engineers and engineering services and

is also of value to engineers, students in engineering and to the engineering educator because it pools the experience of more than 500 industrial companies and engineering organizations. It is the second in a series of Research Reports based on National Executive Research Surveys conducted by the NSPE through its Professional Engineers Conference Board for Industry.

Chapters cover data on the indoctrination of engineers, with suggestions for programs; making the existing engineering staff more effective; the use of supporting personnel; avoiding waste of engineering talent; auxiliary sources of engineering talent; causes and results of engineering turnover and other related subjects. A bibliography of suggested reading on the utilization of engineering manpower is provided as supplementary information.

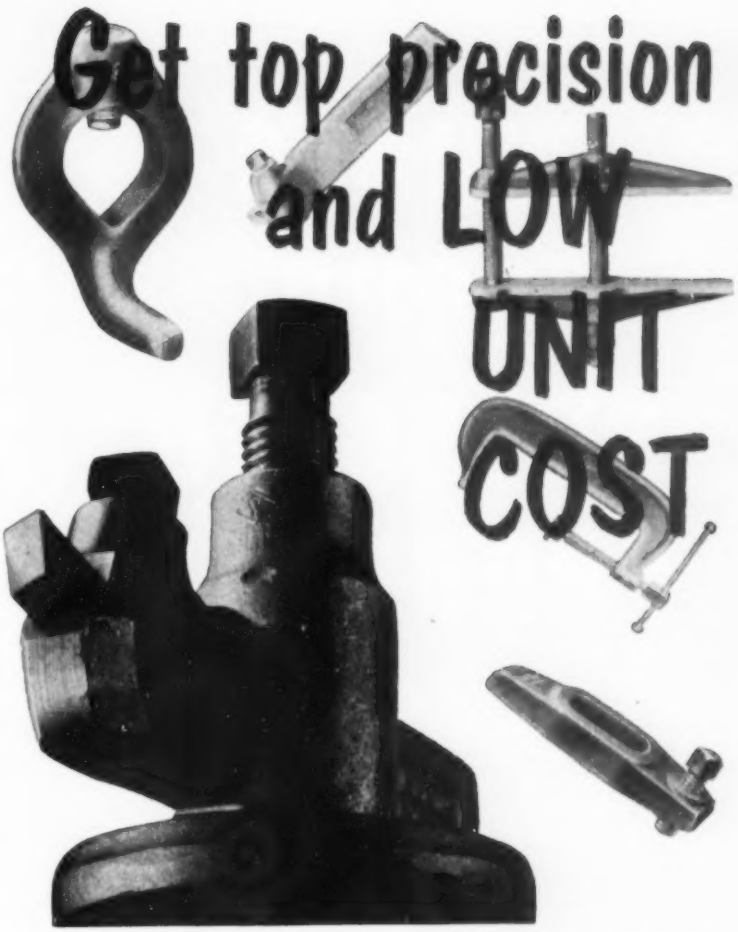
•

ADVANCED MATHEMATICS IN PHYSICS AND ENGINEERING — *By Arthur Bronwell, professor of Electrical Engineering, Northwestern University, and secretary, American Society for Engineering Education. Published by the McGraw-Hill Book Co, Inc, 330 W 42nd St, New York 36, NY. 475 pages, 6x9 in. Price $6.*

This text provides a foundation in the principal branches of advanced mathematics which are used throughout physics and engineering and is primarily intended for students at the senior and graduate level in these subjects. Mathematical topics include infinite series, Fourier series, and the Fourier integral; ordinary differential equations; series methods of solving differential equations, including the Bessel, Legendre, and associated Legendre equations; partial differentiation; Lagranges equations; Hamilton's principle, vector analysis; functions of a complex variable and Laplace transforms.

A feature of the book is a chapter which presents a unified treatment of the solutions of a broad classfication of linear partial differential equations. These include Laplace's equation, the wave equation, both with and without energy dissipation, the heat-flow and chemical-diffusion equations, and others.

Problems have been chosen to supplement the text with additional material and are designed to increase the student's mathematical facility as well as to give him a tangible understanding of the applications of mathematics in physics and engineering.



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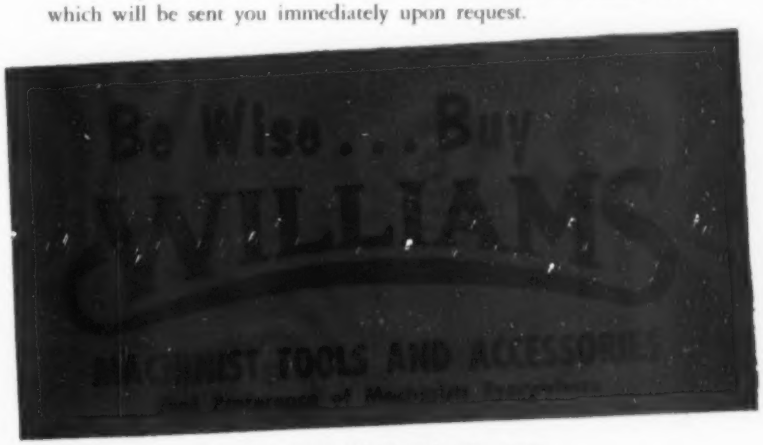

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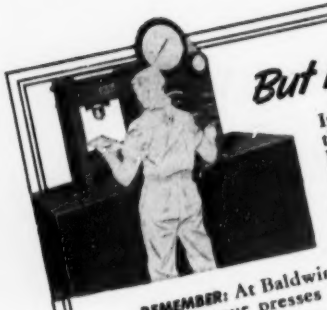

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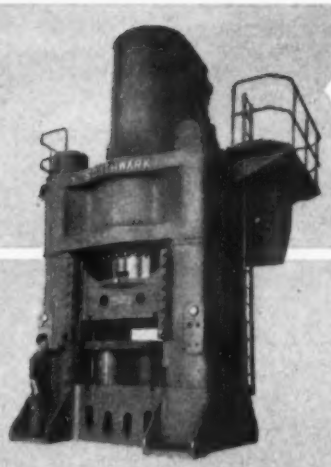

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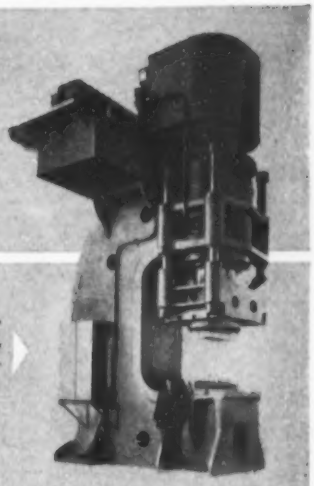

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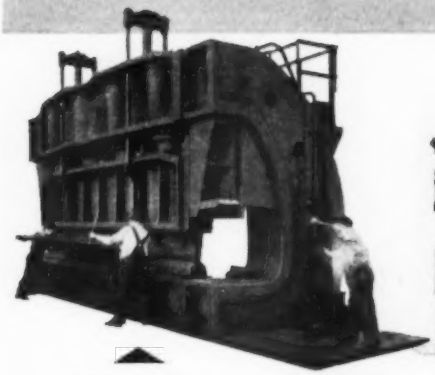
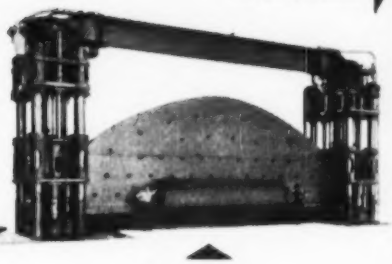
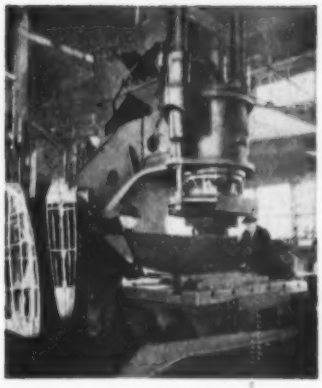


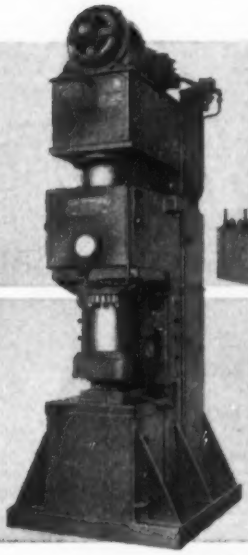
Crimping Presses

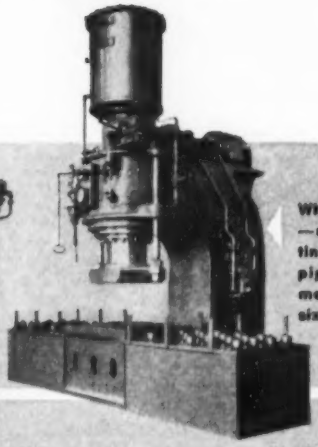
Joggling Presses



Bending Presses







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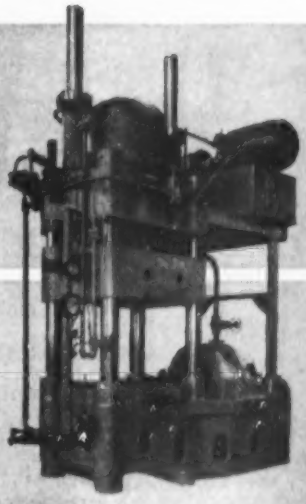

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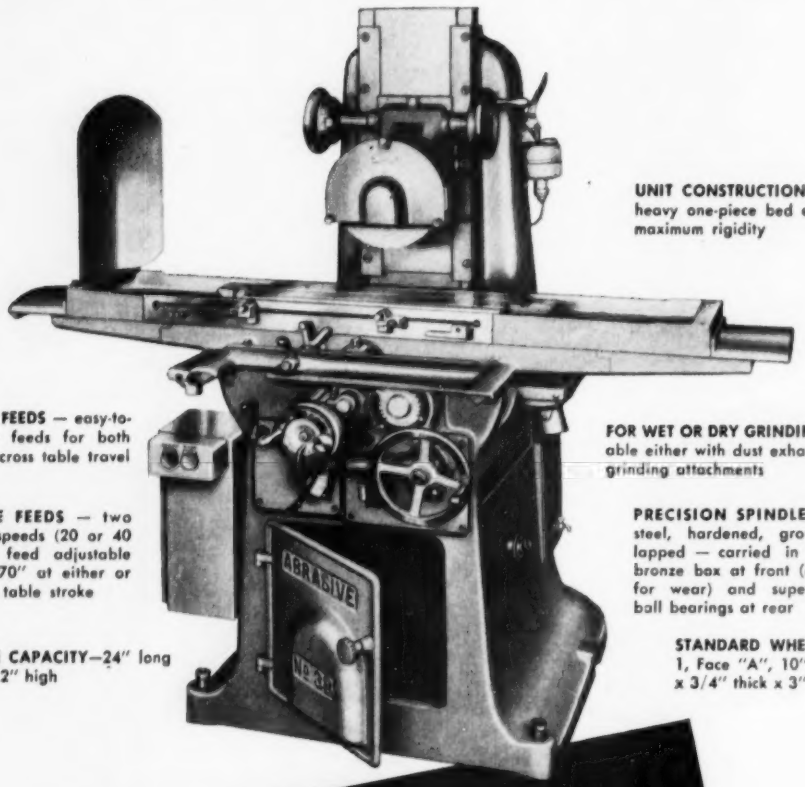

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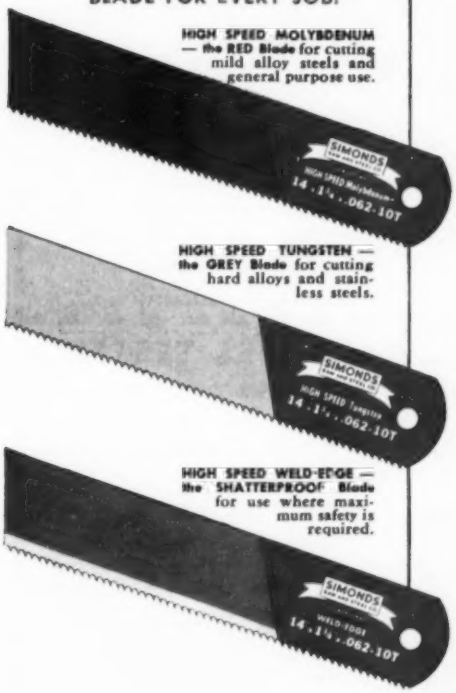
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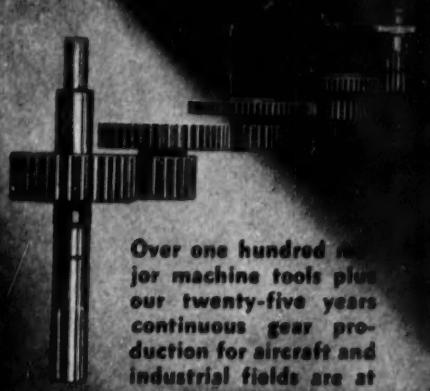

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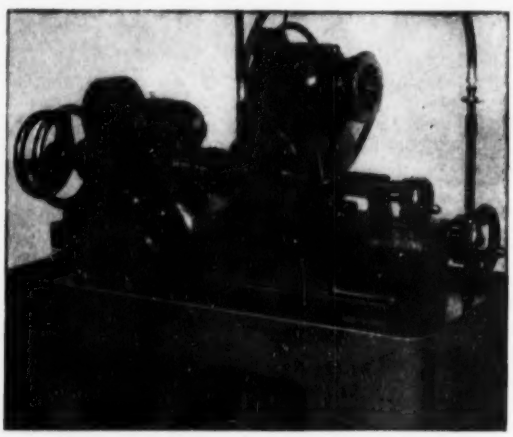

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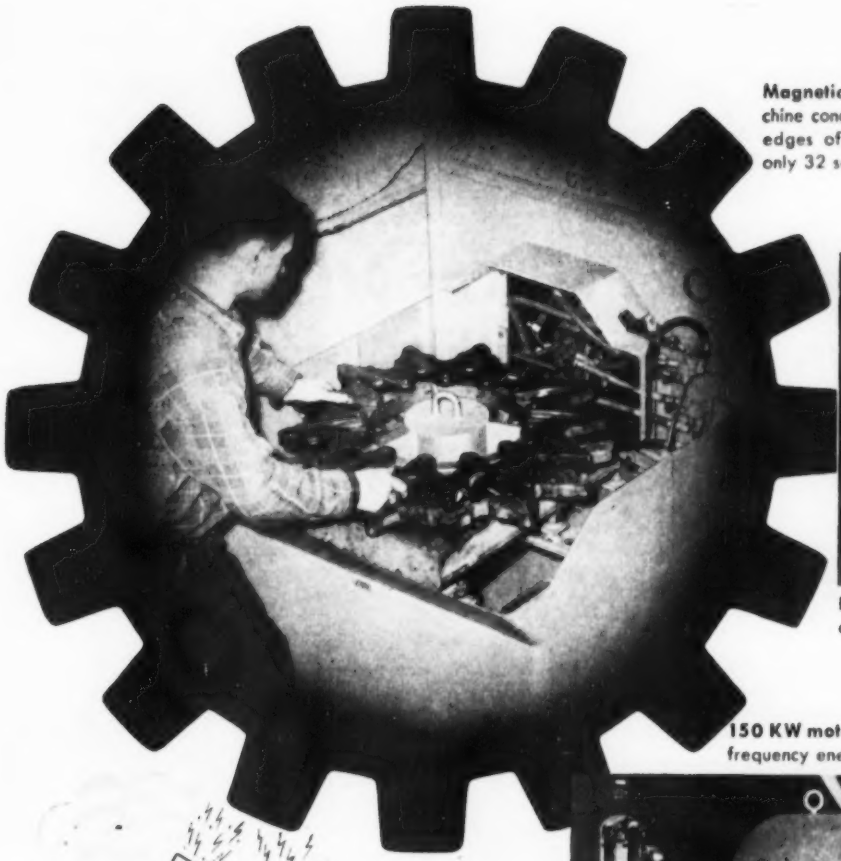
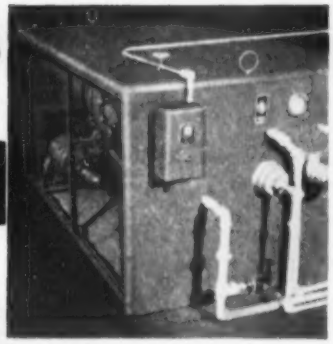


Magnetic field of induction hardening machine concentrates terrific heat on working edges of sprocket tooth, hardening it in only 32 seconds.



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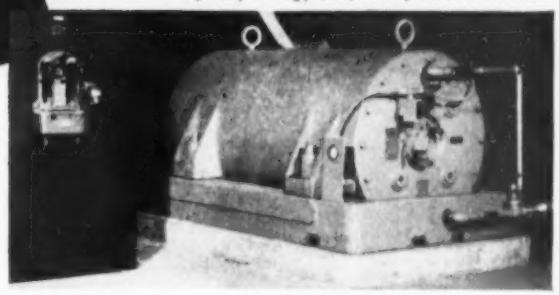

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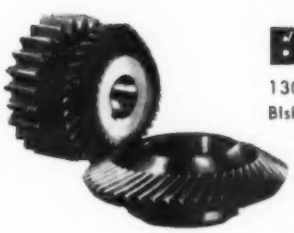

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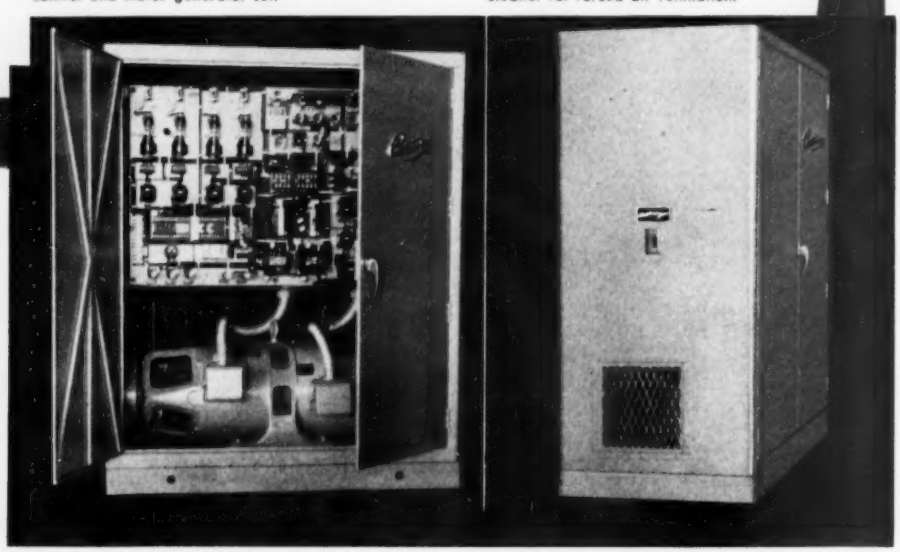
POWER UNIT — Inside front view showing control and motor generator set.

Side view of power unit showing air cleaner for forced air ventilation.



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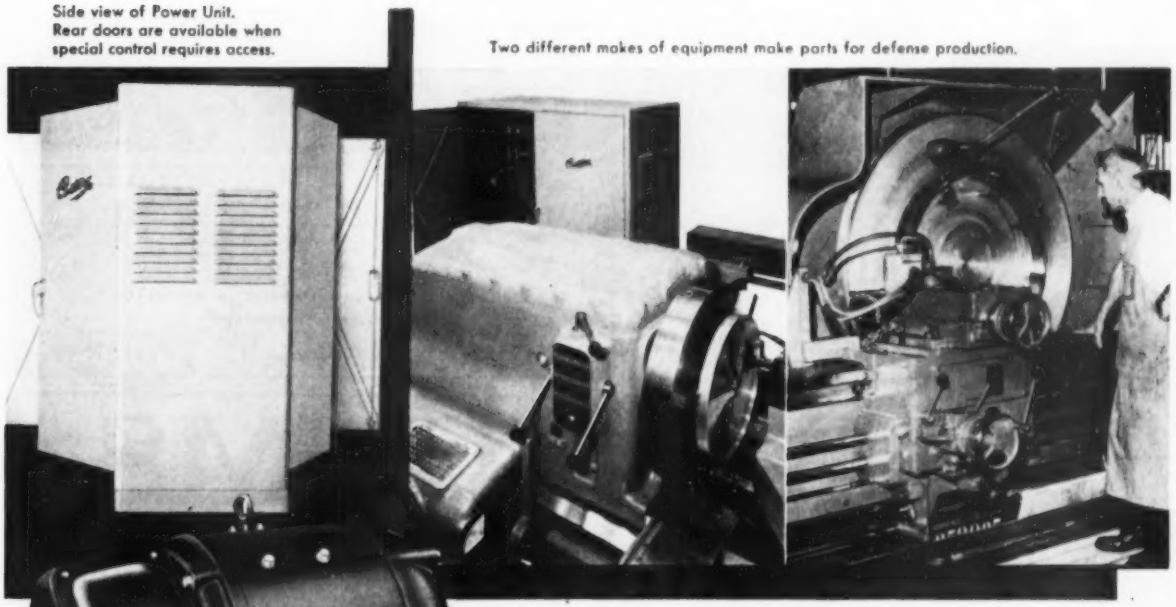

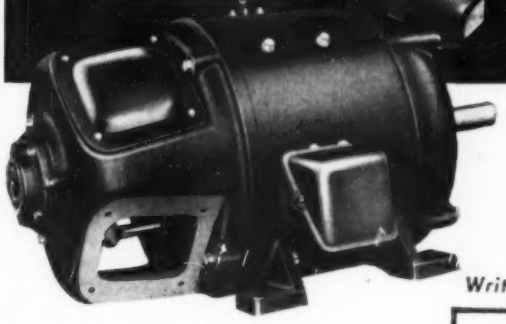

Typical drive motor which operates from the alternating current power unit.

The OPTIMUM cutting speeds are automatically controlled to provide a uniform cutting speed for all the varying diameters of the facing operation.

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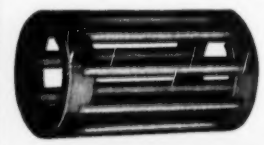
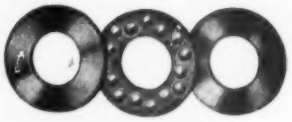
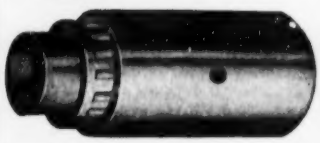

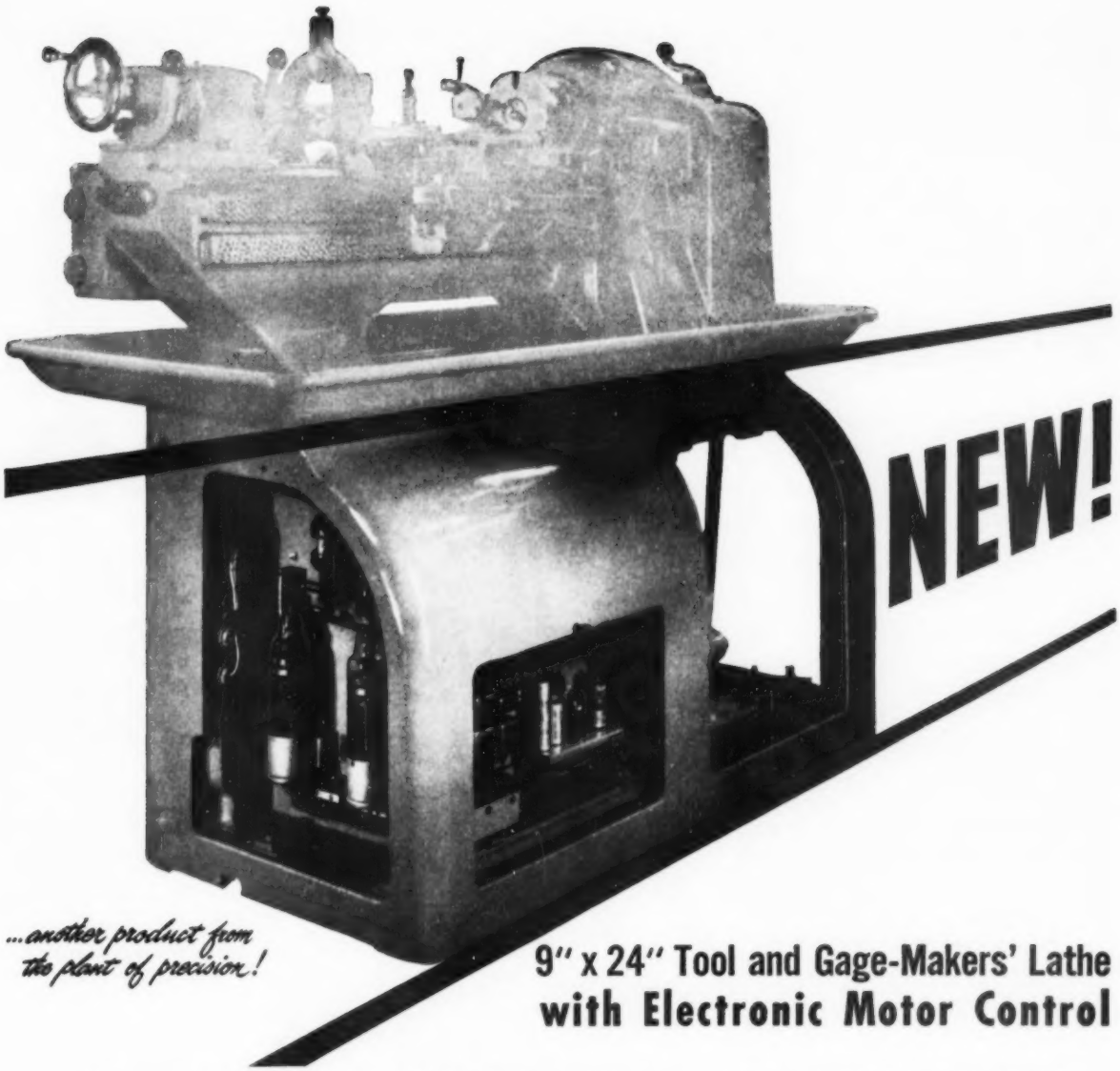

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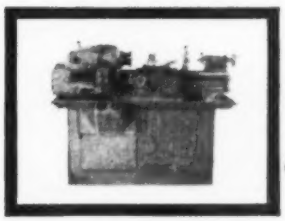

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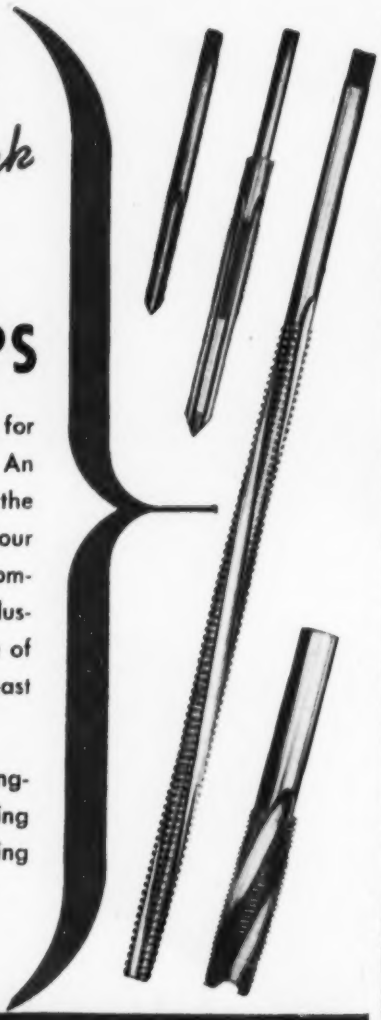
Remember, your best work results only if your Taps are perfectly accurate. REIFF & NESTOR Taps assure you of this.



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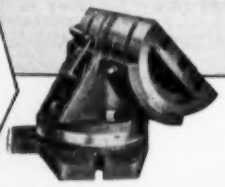
A Precision Tool that Holds Work at Any Desired Angle.



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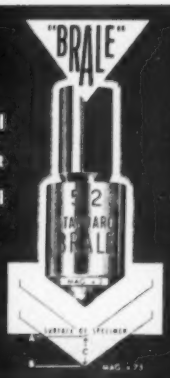

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C. Linear measurement of penetration increase which "ROCKWELL" converts to hardness reading

BRALE Penetrator Accuracy Is Proved in Wilson's Standardizing Laboratory

One point of hardness on the Rockwell C scale equals .00008", so penetrator accuracy must be constant. That's why Wilson maintains its Standardizing Laboratory for testing and approving every BRALE penetrator.

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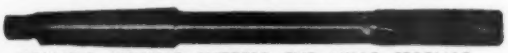

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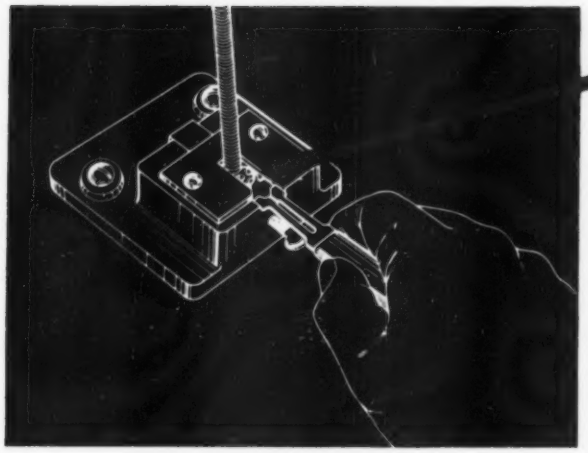
"The Air Express people have carried upwards of 50,000 shipments for Dumont in the last four years. Their ability to trace shipments – especially when being shuttled between stations – is almost uncanny! It has helped us out in many an emergency.

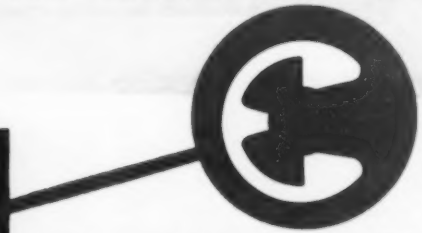
"It pays to specify Air Express – in more ways than one!"

AIR EXPRESS

GETS THERE FIRST

New Waldes Truarc E-Ring Dispenser* Speeds Assembly, Cuts Time and Costs





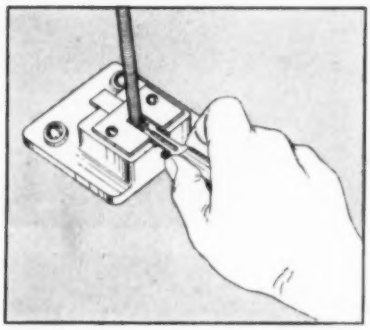
*U. S. PAT. PENDING

FOR GREATER TIME-SAVING, more efficient handling and assembly of Waldes Truarc E-rings,* here is an automatic, precision tool. Designed for one-at-a-time repeating action, the Truarc E-ring Dispenser can be easily operated by any assembly worker.

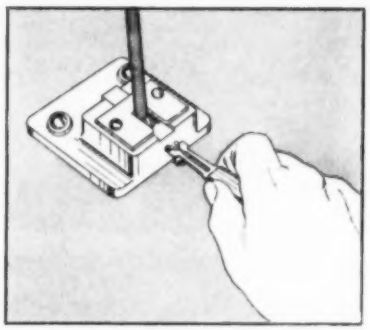
WALDES TRUARC E-RINGS (sizes 5133-9 to 50 inclusive) are now available packed on stackrods in quantities ranging from 250 to 500 pieces per rod. Stackrods are precision-made, allow re-loading in seconds. No interruptions to continuous flow in assembly.

**Dispensers for Waldes Truarc Crescent Rings (series 5103) also available.*

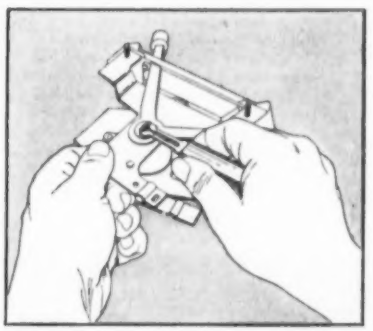
SIMPLE 1, 2, 3 ASSEMBLY OPERATION



1 Truarc applicator is pushed forward and grips a single E-ring.



2 Applicator withdrawn (new ring automatically feeds into place).



3 Ring is installed in groove on shaft. No waste time or motion.

WRITE, TODAY, FOR COMPLETE BROCHURE ON WALDES TRUARC E-RING DISPENSER

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☐ Please send me the new Waldes Truarc E-ring Dispenser brochure.

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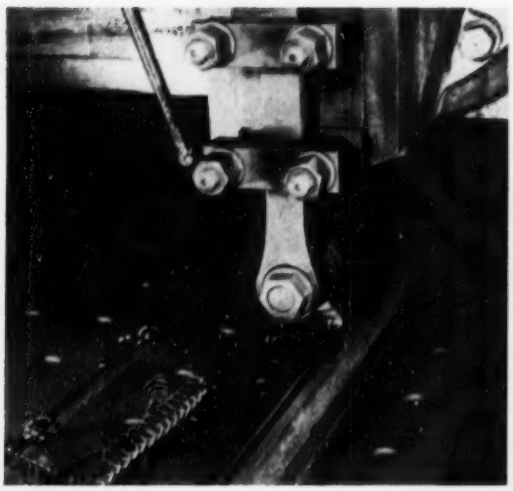

● **PLANING PRESS BRAKE DIES** from free-cutting CARILLOY FC steel at Verson Allsteel Press Co. CARILLOY FC is much easier to machine than the steel previously used, so tools last much longer. In addition, better machinability makes it possible for Verson to get a smoother finish and to use a harder steel for the dies. As a result the dies give better service.

POSSIBLE APPLICATIONS FOR U·S·S CARILLOY FC STEEL

- Arbors
- Armature Shafts
- Axles
- Ball Bearings
- Ball Races
- Brake Press Dies
- Blanking Dies
- Bolts
- Boring Bars
- Bucket Teeth
- Bushings
- Cams
- Chain Links
- Chain Pins
- Chuck Bodies
- Chisels
- Chisel Bushings
- Clash Gears
- Clutches
- Collets
- Connecting Rods
- Connecting Rod Bolts
- Coining Dies
- Crankshafts
- Cutter Bodies
- Cylinder Head Studs
- Dies
- Die Bodies
- Drift Pins
- Drill Shanks
- Elevating Screws
- Embossing Dies
- Expanding Mandrels
- Feed Screws
- Forge Hammers
- Forge Rams
- Forming Dies
- Forming Rolls
- Gauges
- Gears
- Guide Pins
- Hammers
- High Tempered Bolts
- Hydraulic Rams
- Jigs
- Keys
- Knuckle Pins
- Knuckle Shafts
- Lead Screws
- Mandrels
- Master Hobs
- Molds
- Nuts
- Pinch Bars
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- Punches
- Races
- Racks
- Ratchets
- Reamer Bodies
- Reamer Shanks
- Rollers
- Screws
- Screw Drivers
- Shafts
- Shear Blades
- Sleeves
- Sleeve Shafts
- Spindles
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- Universal Joints
- Valve Studs
- Worms
- Wrenches

gets better finished machining

with pre-hardened, free-cutting

Carilloy FC Steel

VERSON Allsteel Press Co., of Chicago, now makes the dies for big press brakes from U·S·S CARILLOY FC steel instead of an ordinary die steel. Pre-hardened, free-cutting FC steel enables this important manufacturer to make harder, smoother dies that are easier to produce.

Here's what Verson says about the performance of FC steel: "This steel cuts much cleaner and more easily than the steel we had been using. As a result, our cutting tools last much longer and the dies are not damaged during machining—even though we are using a much harder steel (300 BHN instead of 250 BHN). In addition, we put a smoother finish on the dies.

"Smooth finish is especially important in press brake dies, because metal is literally dragged over the die during forming. With these smoother dies, less pressure is needed to make a bend and the dies do not scratch the metal.

"Since the dies are harder, they work better on high tensile steels . . . often eliminate the need for re-treating the dies after use. We're well satisfied with FC steel."

Carilloy FC is ready for use when delivered

U·S·S CARILLOY FC steel comes to you already quenched and tempered to the hardness you require and doesn't require heat treatment after machining. It comes in all standard bar forms and sizes in a hardness range from 255 to 375 Brinell. Tensile strengths range from 125,000 to 175,000 psi.

Our experienced metallurgists will be glad to discuss the possible applications of pre-hardened, free-cutting FC steel in your products. Just write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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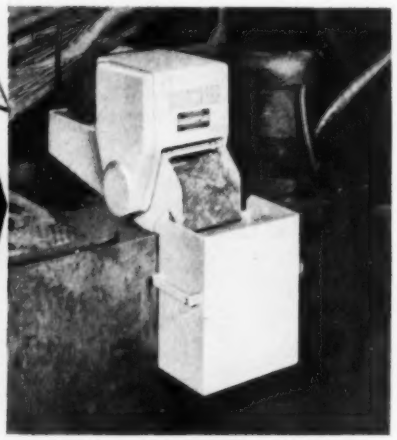
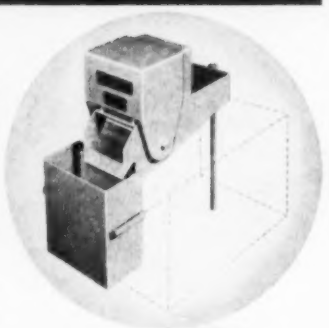


...with Sundstrand Magnetic Coolant Separator

Installation of a Sundstrand Magnetic Coolant Separator on a grinder, as shown above, resulted in a yearly saving of $1927.12. Further, instead of cleaning the coolant tank twice daily, it now requires cleaning only *twice weekly*. Cost of the installation is approximately $475.00. The unit requires no attention and little or no maintenance.



Easily Installed Without Additional Piping . . . . . .

An important feature of this magnetic coolant separator is that it can be dropped into position on most open type coolant tanks. No additional piping is required. Install one on your present equipment and compare its efficient operation with other units.

Free Additional Data

This folder will give you the complete facts on the Sundstrand Magnetic Coolant Separator. Write for your copy today. Ask for bulletin 128-M.

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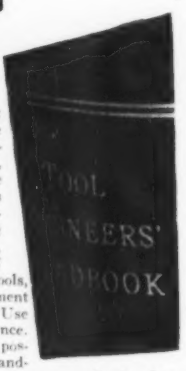

THIS handbook brings you the most modern, authoritative data on the design, fabrication, maintenance and economical use of tools and machinery used in industry. It covers product design and cost estimating, the economical selection of machines, processes, and tools, the analysis and improvement of setups and operations. Use it with complete confidence. Data are based wherever possible and practicable, on standards established by the government, professional associations and leading industrial companies.

TOOL ENGINEERS' HANDBOOK

American Society of Tool Engineers
Frank W. Wilson, Editor-in-Chief

Written by 144 authorities in the field, this massive reference, consisting of 115 big sections covering tool engineering from A to Z, has been checked and double checked from cover to cover to insure accuracy. Here are the complete, authoritative answers to your problems, brought to you in compact, easy-to-find form.

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A small selection of highlights selected at random to illustrate the scope of this Handbook:

- Describes types of machines, cutting tools, tool holders, fixtures and operations in precision production boring.
- Includes all new techniques and processes of recognized acceptance including Powder Metallurgy, Investment Casting, Plastic Joining of Materials, etc.
- Conventional tables of feeds, speeds and cuts modernized to bring them into line with latest cutting-tool materials and cutting practices.
- Treats, process-wise, such topics as Plaster Mold Casting, Superfinishing, Rotary Swaging, Sheet and strip cold roll forming, Die Hobbing, etc.
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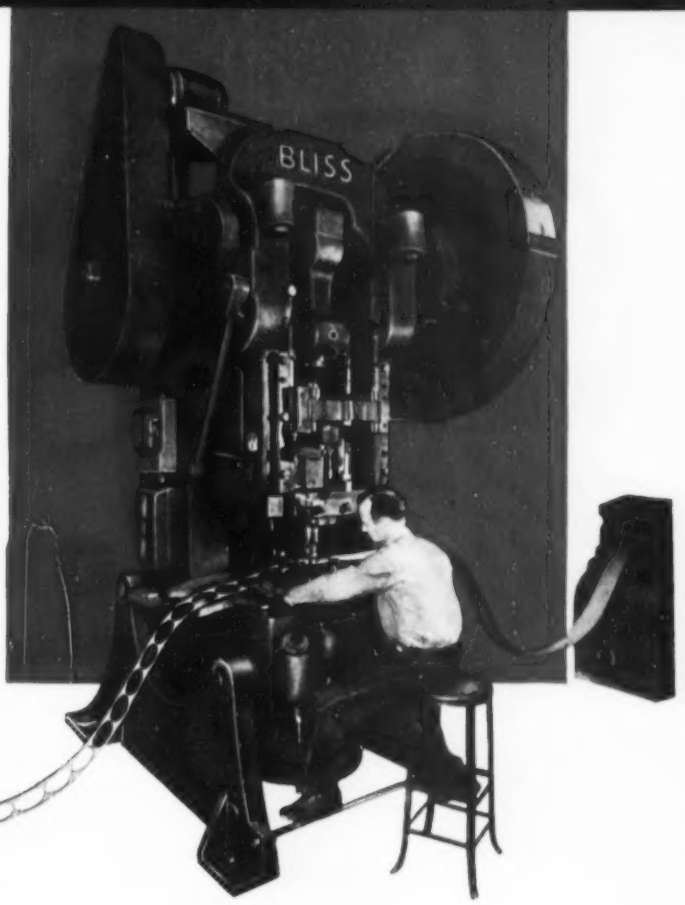

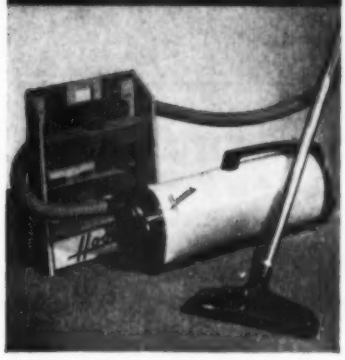

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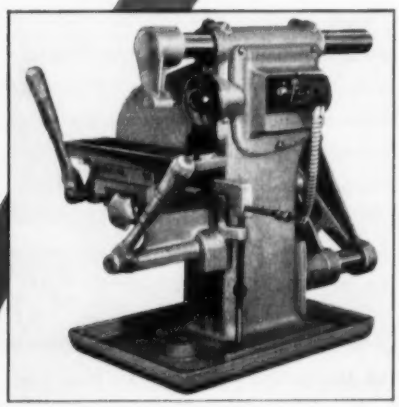

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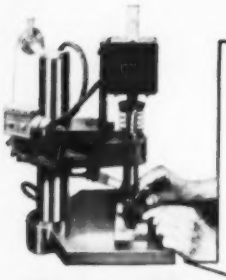

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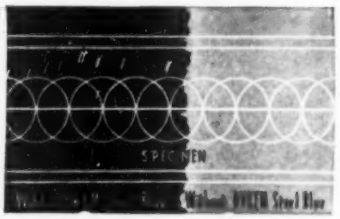

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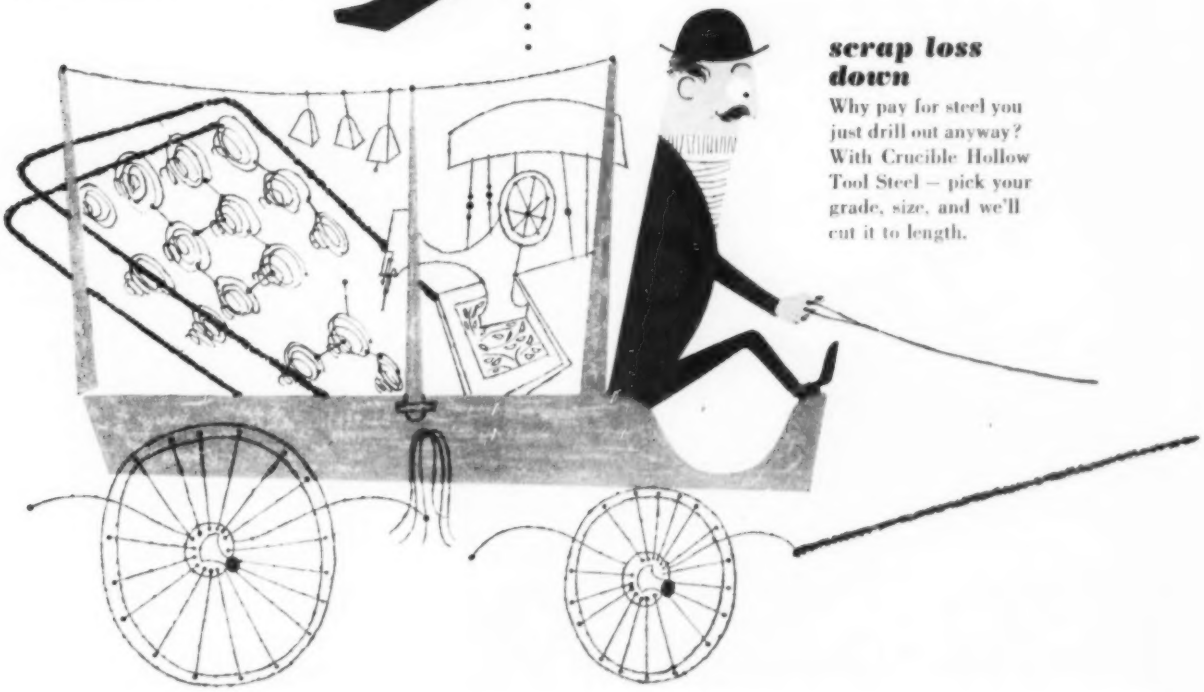
Manufacturing costs go down when you use Crucible Hollow Tool Steel. Expensive machining is eliminated. Production time per unit is lowered. Machine capacity is increased.



scrap loss down

Why pay for steel you just drill out anyway? With Crucible Hollow Tool Steel — pick your grade, size, and we'll cut it to length.

Here's another reason it pays to get a proposal from Fosdick

We check flatness to 40 millionths

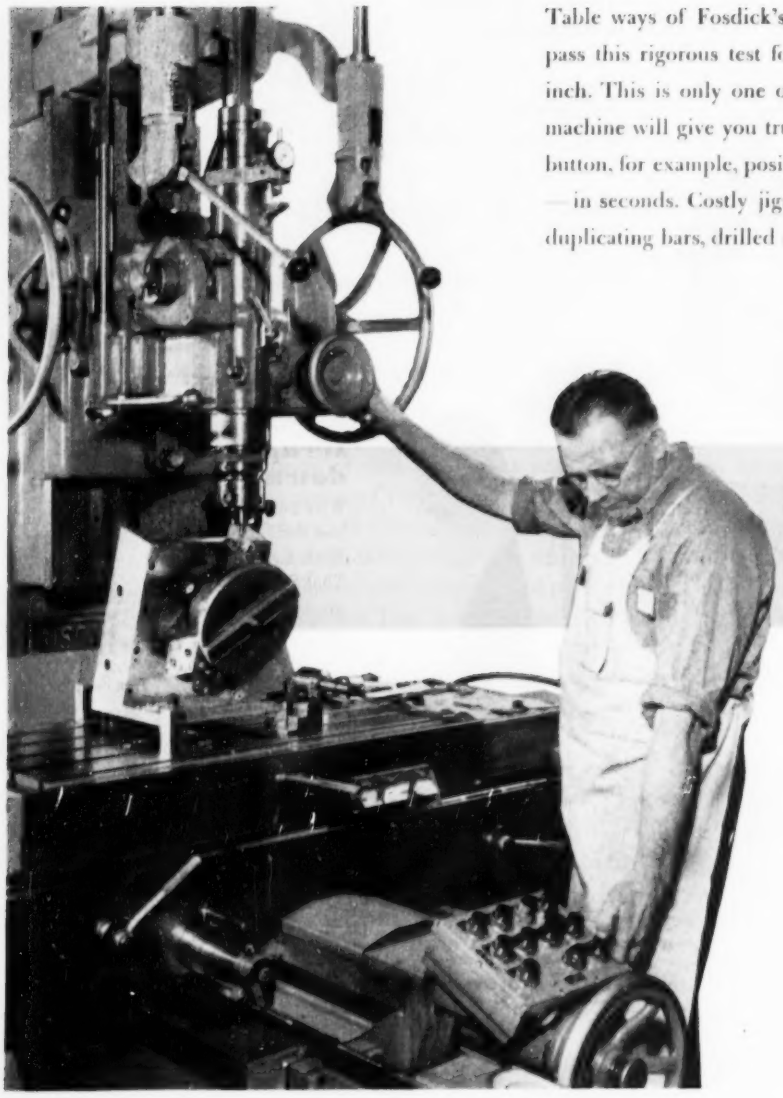


Table ways of Fosdick's Automatic Positioning Machine must pass this rigorous test for flatness—within 40 millionths of an inch. This is only one of many tests we run to make sure this machine will give you true precision production. The touch of a button, for example, positions work for each new hole to ± .0001″ —in seconds. Costly jigs have been replaced by two $\frac{3}{8}$″ square duplicating bars, drilled quickly for the job, stored easily.

to give you

Boring Time "Nose Dives" at Fairchild.

Mass production of precision magnesium housings for commercial and military cabin pressurizers at Fairchild Engine and Airplane Corp. demanded speed and high accuracy. Fosdick's proposal recommended Automatic Positioning Machines. Now Fairchild drills, faces and bores $\frac{31}{32}$″ holes with accuracy to ± .0001″—*has slashed boring time 40% over former methods.*

For full description of the Automatic Positioning Machine ask for Bulletin APA.

precision production like this

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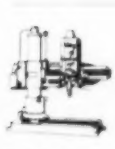
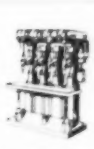

Radial Drills

Jig Borers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Automatic Positioning Machines

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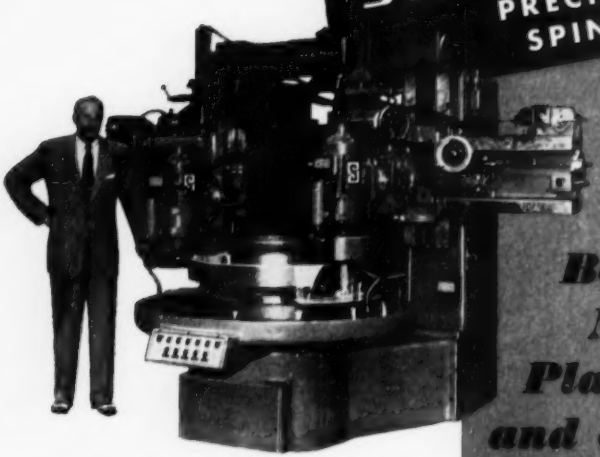

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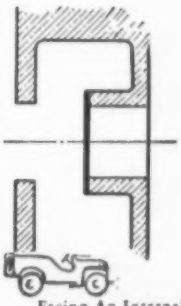
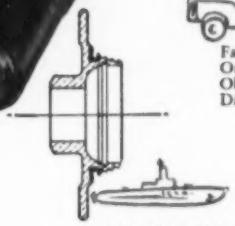


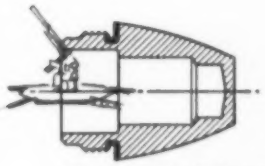
Facing An Internal Boss On Motor Castings Where Obstruction Usually Causes Difficulty.



Both Inside And Outside Clearance Grooves Cut In One Operation On Oil Tank Caps For Submarines.

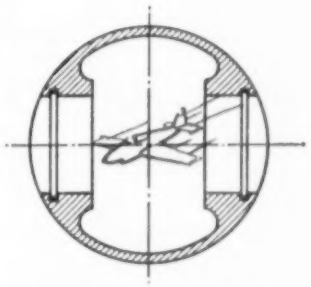
TYPICAL RECESSING-TOOL OPERATIONS

Formed Recesses Made In One Operation On Detonator Bushings Of Large Calibre Motorized Artillery Rifles.



Groove For Thread Clearance Cut On Anti-Aircraft Projectile With Automatic "Necking" Tool.

Casting Of Part For Army Tank On Which Two Recesses Are Made At One Time.



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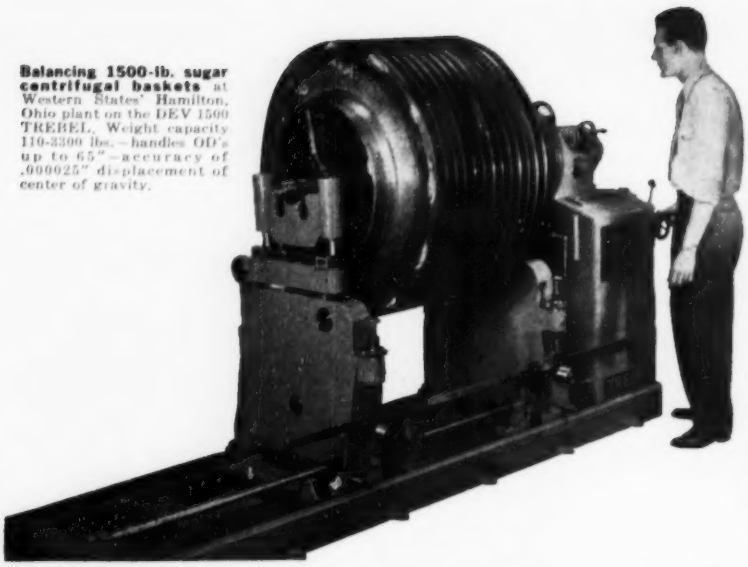

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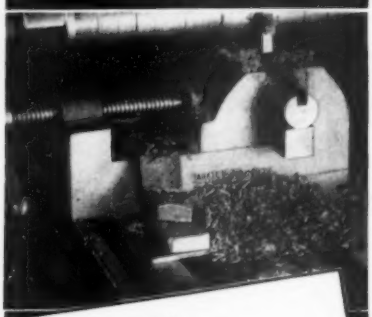
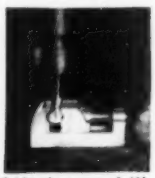


Give *Start-to-finish* work holding

Off the swivel base, end down for accurate marking.

Back on the swivel base, at the bench, for center punching.



Lifted onto drill press, still accurately in position.

Held in same position but moved to milling machine.

Take a job through every step without a misstep . . . faster, easier . . . in a "Yankee" Vise. Work lined up accurately from bench to drill press, to milling machine and back to bench. Lifts off and on a swivel base at the bench. Vise squared on top, bottom, sides and front end for machine work. Easily made into handy, economical jig. Hardened steel block, V-grooved, provided with each "Yankee" Vise. Four sizes, with and without swivel base . . . 1½", 2", 2¾", and 4" jaw widths. Your industrial distributor carries the full line. **"Yankee" Tool Book FREE!**

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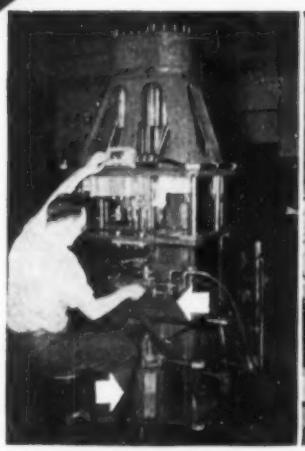

REDUCES FATIGUE

One pushbutton starts the Natco cycle for continuous, automatic operation of this drilling machine. Hanna Hydraulic Cylinders feed the table and Hanna Pneumatic Cylinders engage drillpress clutch and workpiece clamp.

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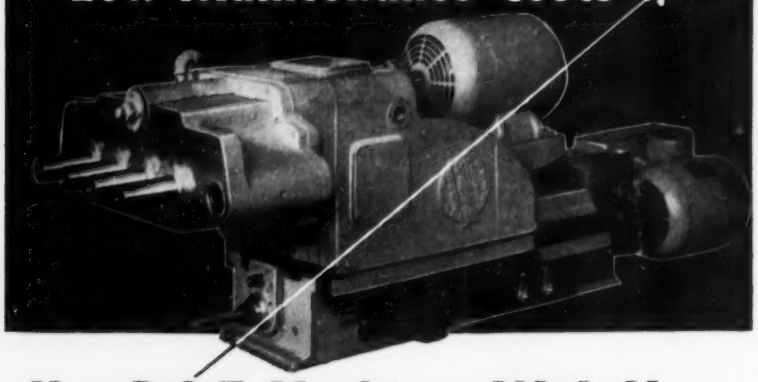
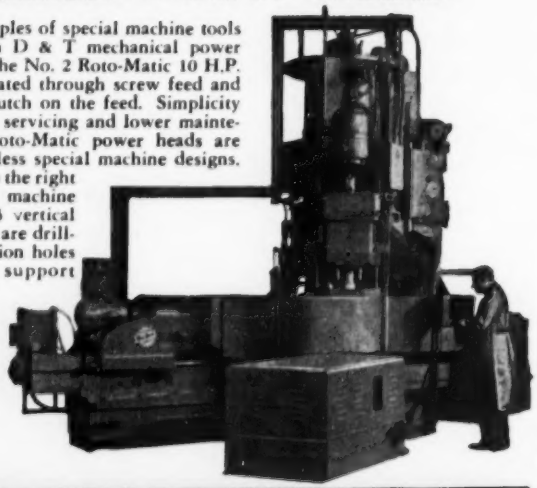


Use D&T Machines With New Mechanical Power Heads

Here are two good examples of special machine tools designed and built with D & T mechanical power heads. Shown above, is the No. 2 Roto-Matic 10 H.P. head. All sizes are operated through screw feed and have overload release clutch on the feed. Simplicity of design makes for less servicing and lower maintenance costs. D & T Roto-Matic power heads are readily adapted to countless special machine designs. For instance: Machine to the right is a 6 station indexing machine with 3 horizontal and 3 vertical power heads. Operations are drilling and reaming suspension holes and king pin holes in support arms for power heads.



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is available on the complete line of D & T machines. Ask for Bulletin 1000.

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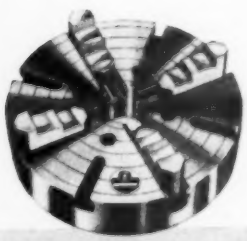
this name is your guarantee of dependable performance . . . backed by 102 years experience in the manufacture of the world's finest chucks.



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Feeds ferrous, non-ferrous strip or sheet . . . faster, safer. Use for stamping, shearing. Right or left hand non-slip fitted grip, self-adjusting. Sturdy, hardened work surfaces. FULLY GUARANTEED. *Write today. Early delivery.*

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Here's How WYMAN-GORDON trims jet engine turbine wheels with a 600 ton Verson CRANK TYPE PRESS

At Wyman-Gordon Company, as in many plants engaged in the production of the implements of defense, modern Verson presses are helping to speed production and cut costs. Take the job illustrated below—forged jet engine turbine wheels are trimmed neatly and quickly in a single stroke of a 600 ton Verson crank type press. Routine, yes, but it is the sum of such production techniques as this that enable our plants to meet the demands of a part war—part peacetime economy.

Illustrated above is the 600 ton Verson single crank, single action, double gear twin drive press. Bolster area, F.B. x R.L., is 56" x 48". At left the piece being removed from the press after trimming.

A Verson Press for every job from 60 tons up.

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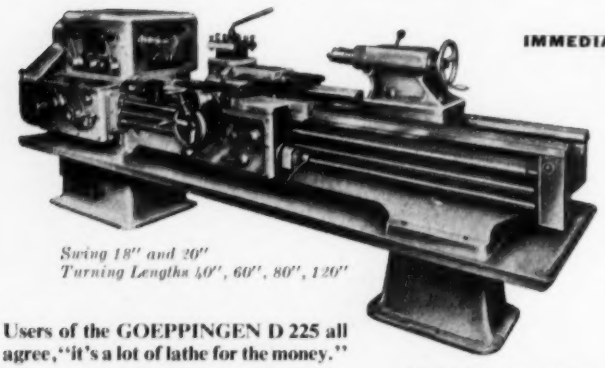

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Turning Lengths 40", 60", 80", 120"

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Extra-wide bed without gap adds greater swing diameter, handles work up to 21".

V-belt drive transmits power through 10 or 7½ h.p. motor to geared head...eliminates vibration. 18 spindle speeds 22-1120 rpm.

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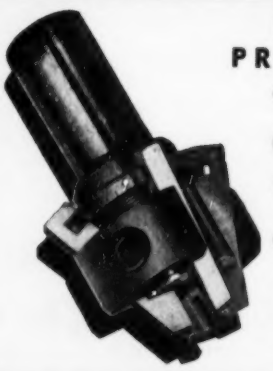

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Photo SW-654

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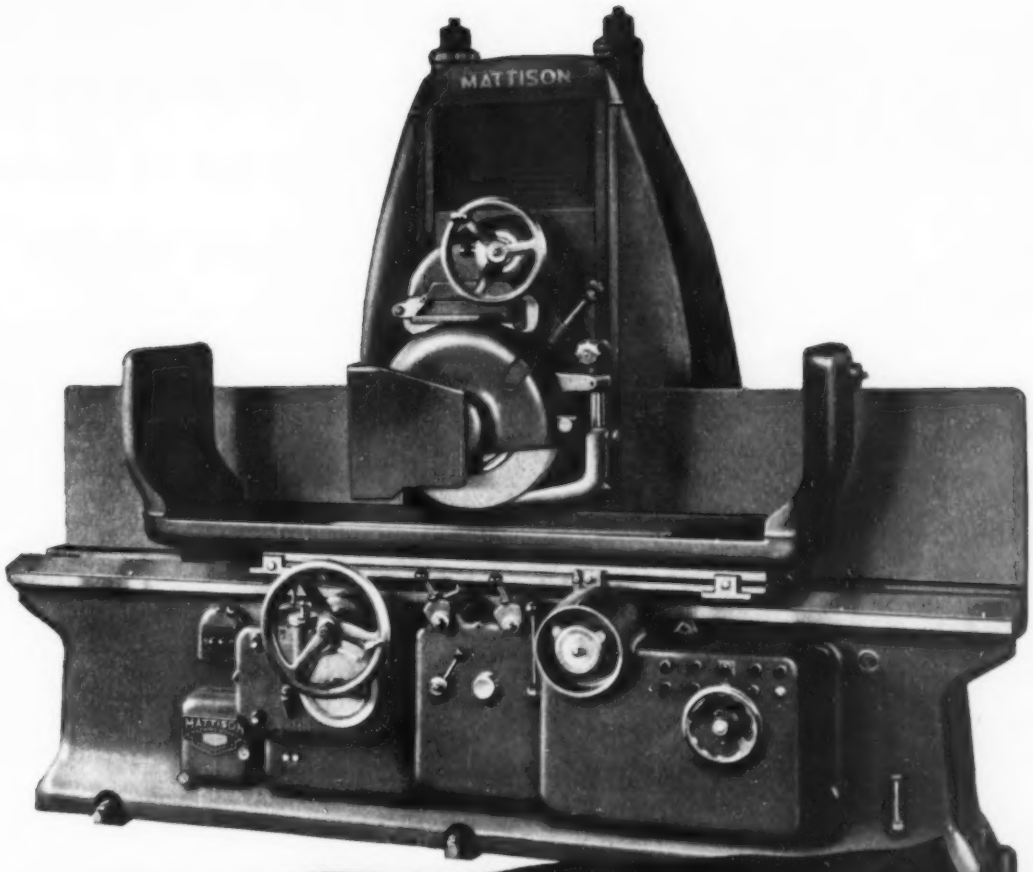
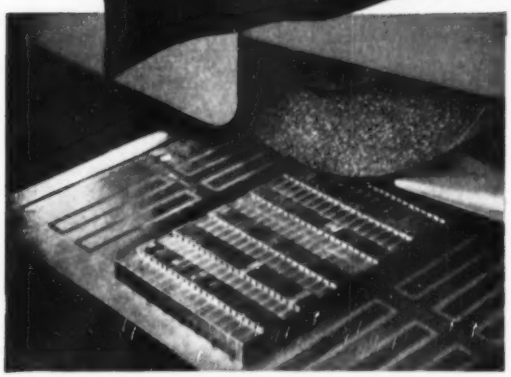


HERE'S A CHANGE THAT INCREASED PRODUCTION FROM 30 PER HOUR TO 200 PER HOUR



Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production — 30 per hour.

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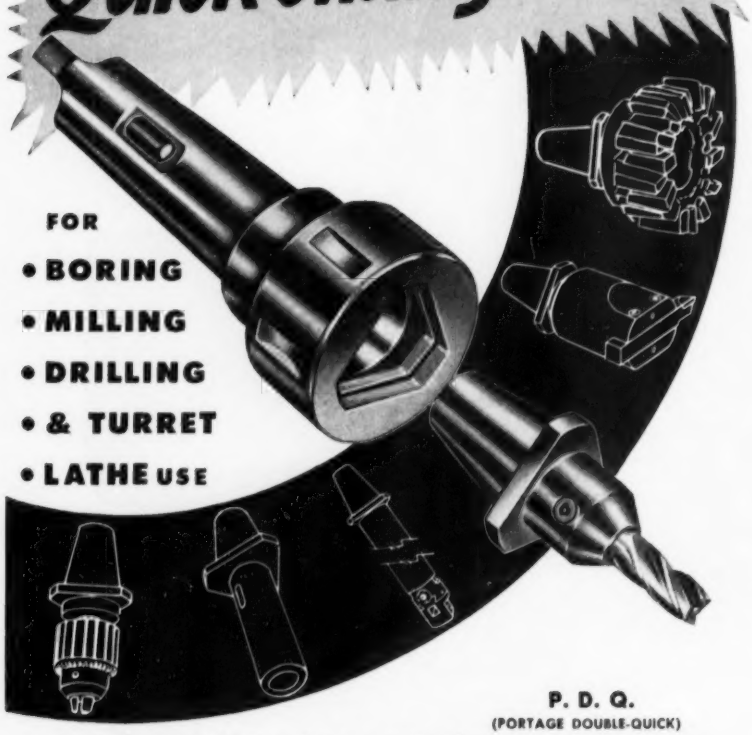

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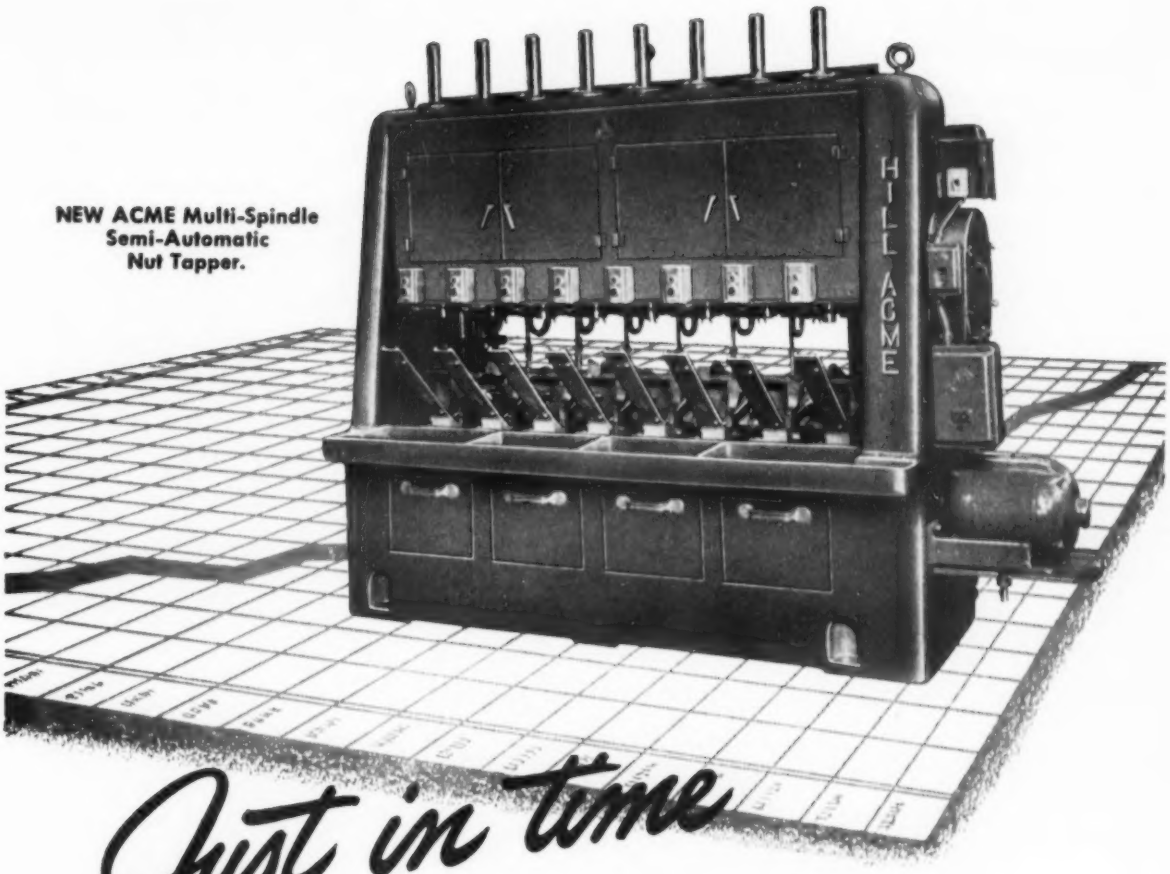

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Just in time

TO HELP YOU INCREASE PRODUCTION

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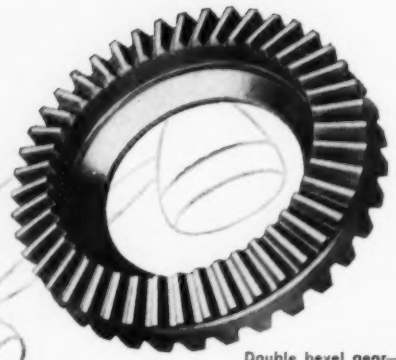

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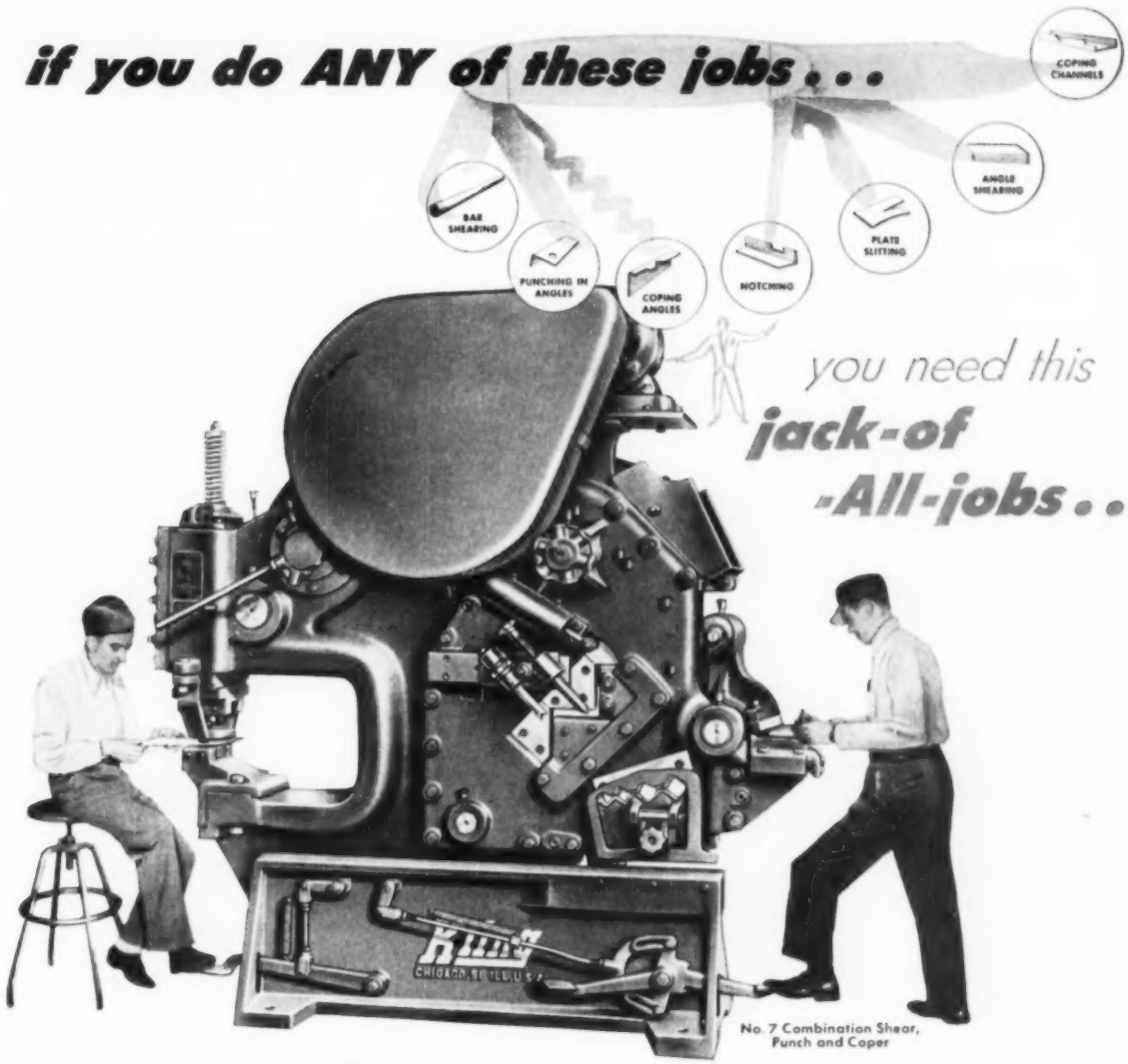

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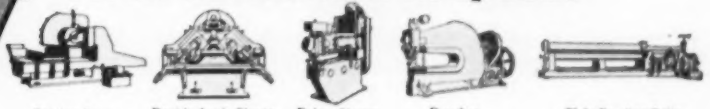

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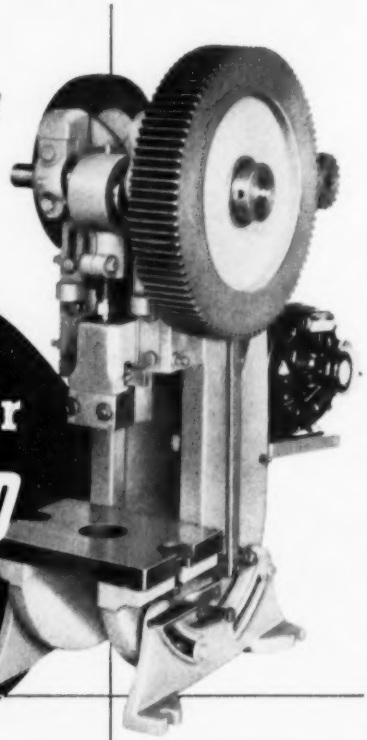

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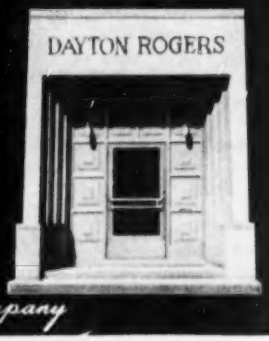

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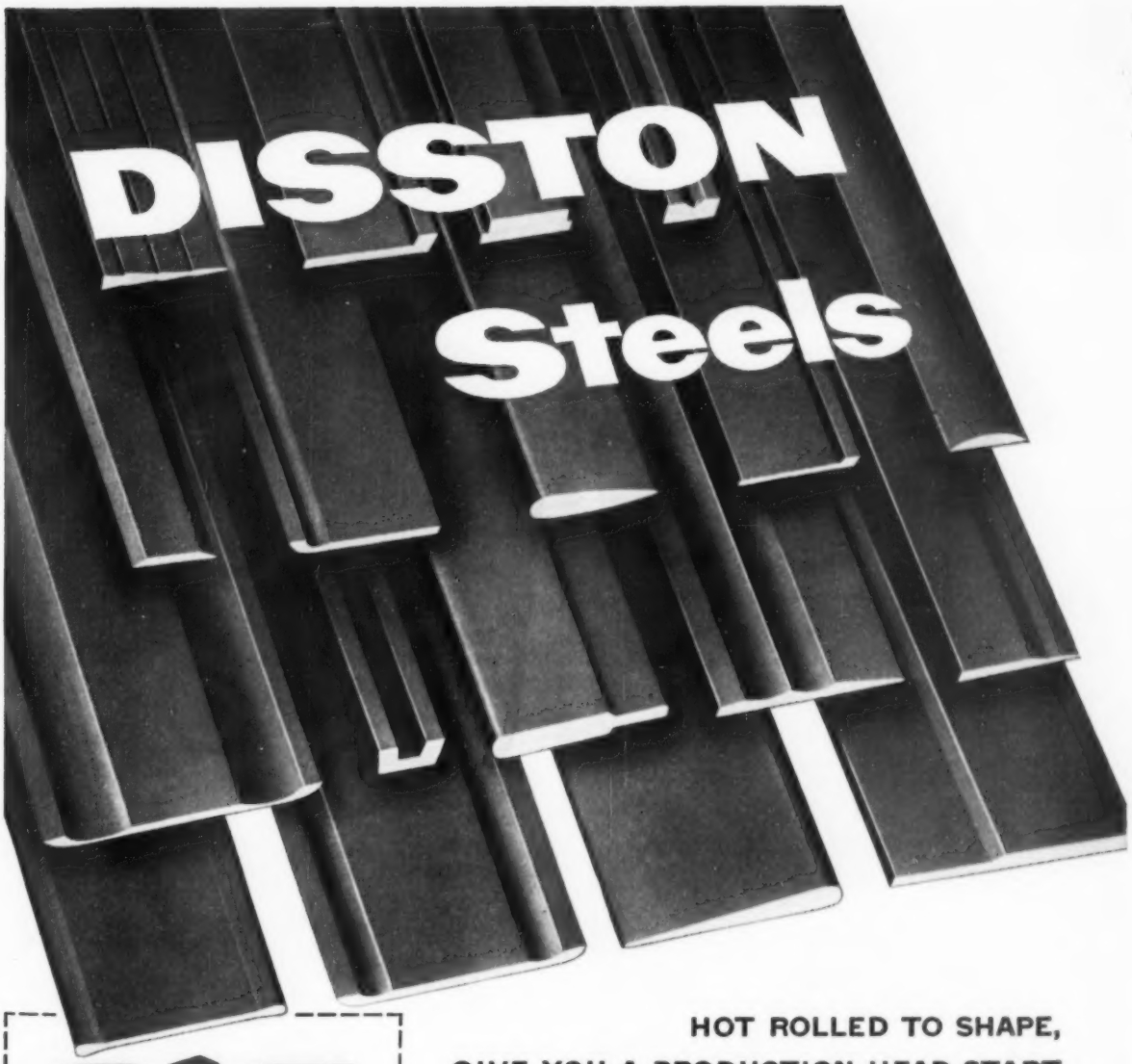

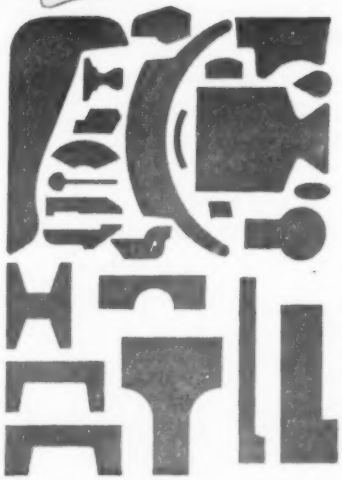

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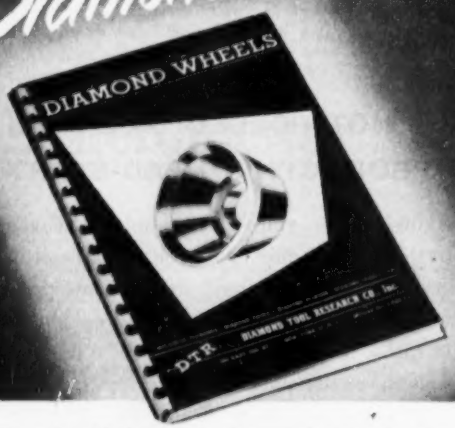

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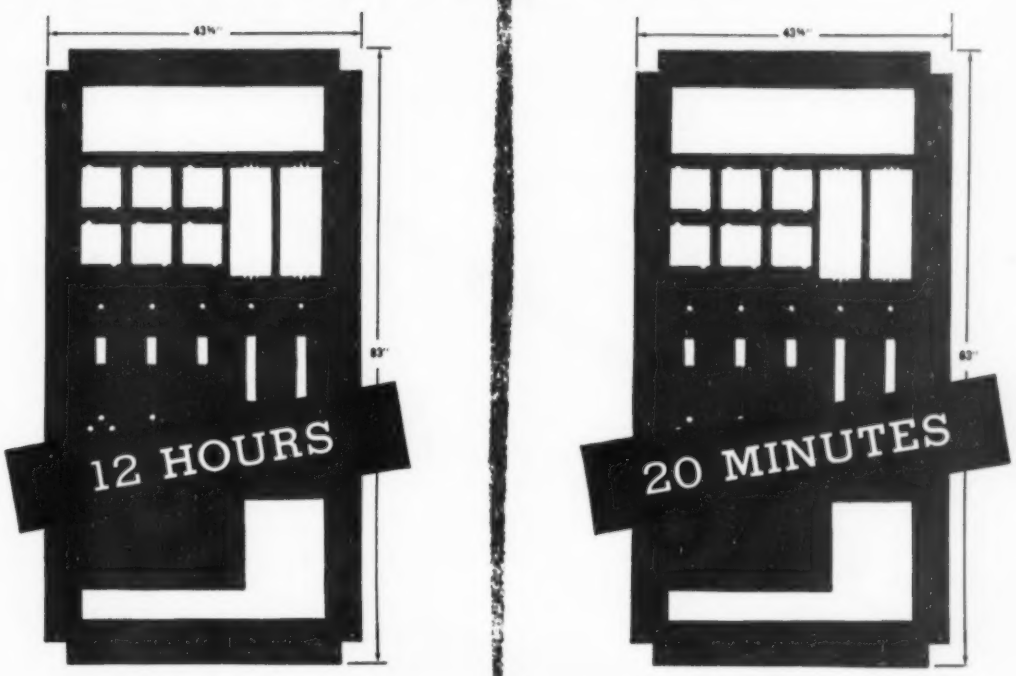

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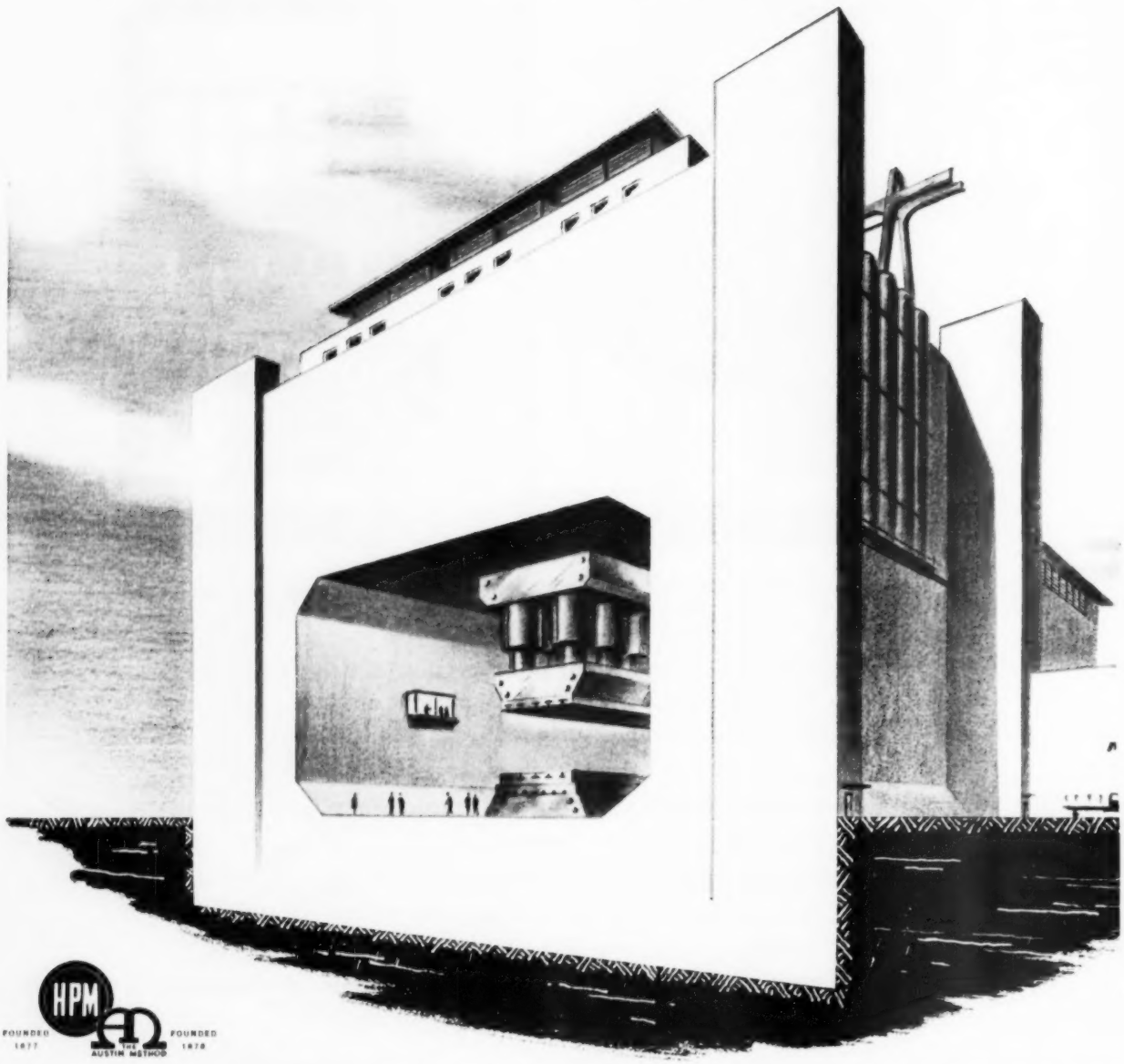

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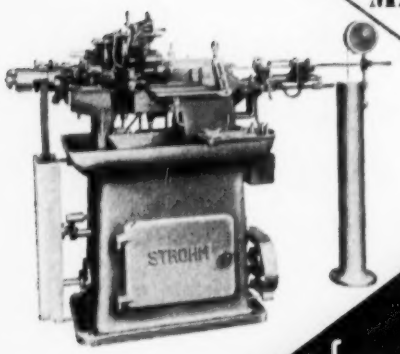

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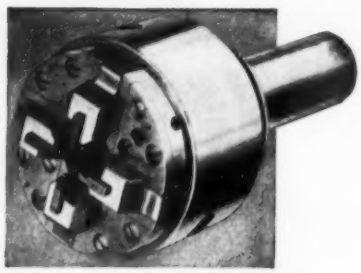

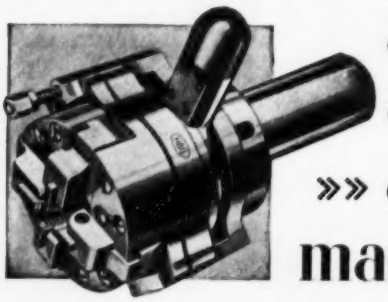

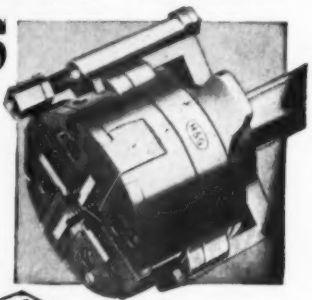

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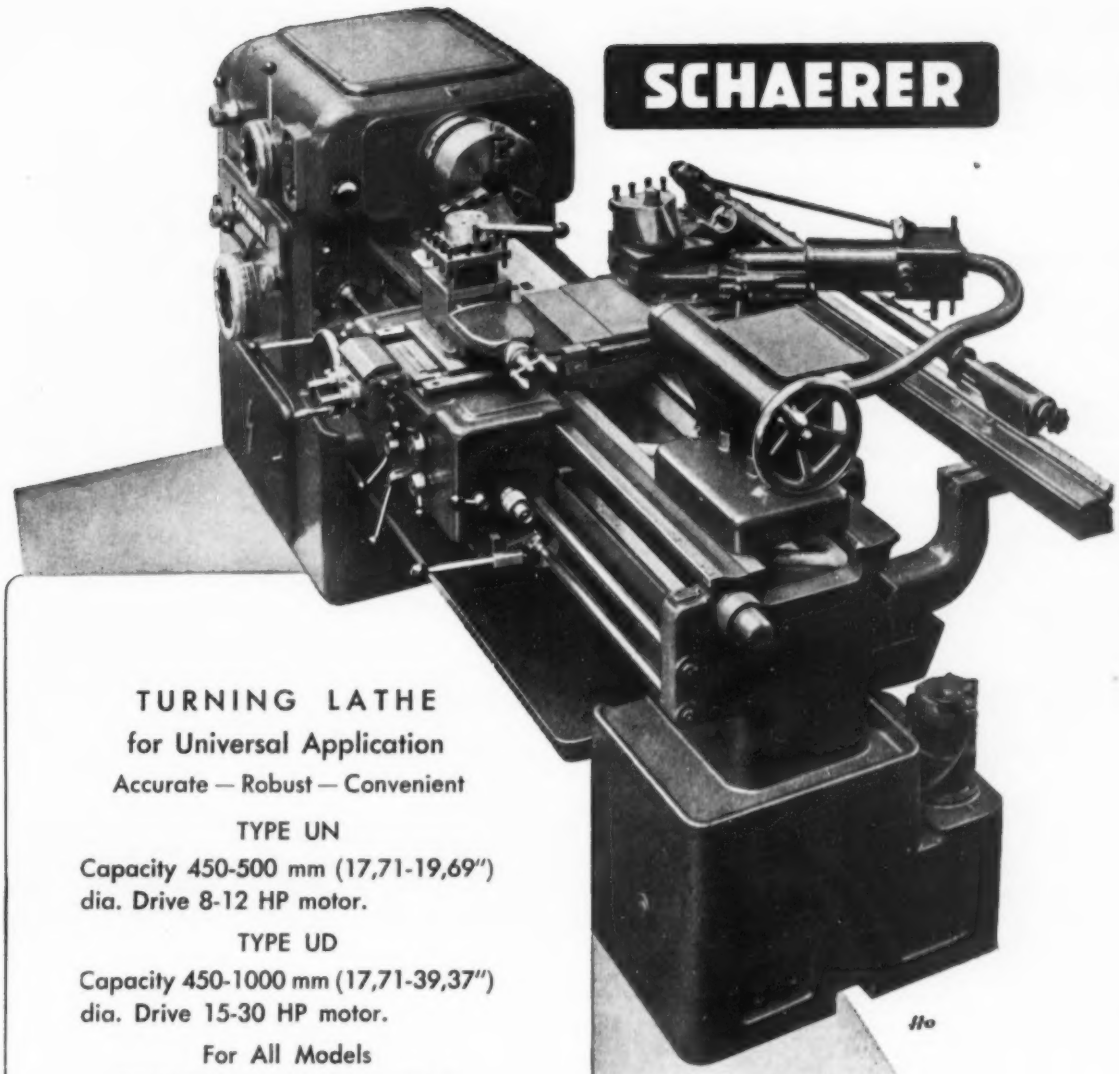

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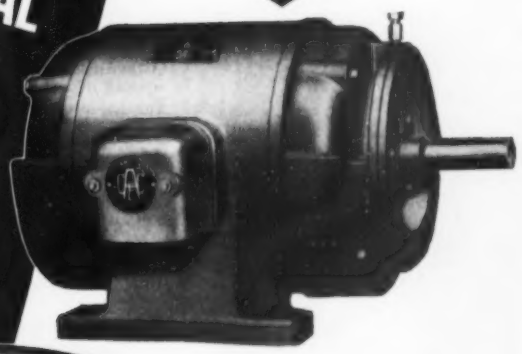

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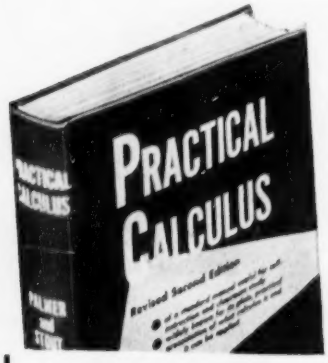

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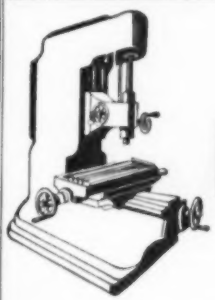


SEARCHLIGHT Equipment Spotting SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised.

Just send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., New York 36, N. Y.

Please help us locate the following used equipment:

NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... ZONE ..... STATE .....

YOUR **FUTURE** IS **YOURS** AT

AS A

DESIGN ENGINEER

SUNDSTRAND

- **WHO** will be working on basic design of metal working and hydraulic machinery . . .
- **AT** one of the leading manufacturers of machine tools and hydraulic equipment . . .
- **IN** Rockford, a friendly city within 90 miles of metropolitan Chicago.

This will be a permanent position with a highly progressive company, having substantial insurance and pension programs. . . . Send us a post card asking for an application.

SUNDSTRAND

MACHINE TOOL CO.

ROCKFORD - - - - - - - - ILLINOIS

Executive Engineers $ to 15,000. Designers—all kinds to 12,000. Tool Designers—Engineers $ to 12,000. Detailer, Draftsmen and Trainers—Highest Pay—FREE. Employers pay our fees on the above. We also place all types of manufacturing executives, office and sales executives.

J. L. OVERHOLT, Wabash Employment Agency
202 S. State St., Chicago, Illinois

DI-TRU

For Greater Efficiency and Better Grinding Results Have DI-TRU Reset Your Worn Diamond Tools.
Same Day Service
$1.00 Per Reset

DI-TRU DIAMOND TOOL CO.
1479 A 38 ST BKLYN 19, N.Y. UL 3-3426

PRODUCTS WANTED

Small manufacturer of machinery wishes to expand present facilities. Willing supplement present equipment. Will work royalty, license basis, etc. Especially qualified to manufacture and assemble heavy machinery. Plant in Connecticut. All replies confidential.

CW-6609, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

Lafayette the GRINDING SPECIALISTS

- **BLANCHARD UP TO 84" DIAM.**
- **SURFACE UP TO 36" x 120"**

Anything from 84" diam. circle to ⅛" diam.
Anything from ⅛" square to 36" x 120"

CENTERLESS UP TO 20' LONG — INFEED-THRUFEED SHOULDER & BAR
CYLINDRICAL EXTERNAL UP TO 16 x 80 — INTERNAL GRINDING
DOUBLE DISC GRINDING — ALL SHAPES — ALL MATERIALS
Steel—Bronze—Plastics—Aluminum—Stainless Steel—Brass, etc.

CLOSEST TOLERANCES — FINE FINISHES — PRICES RIGHT
EXTREME FLATNESS — DELIVERIES ON TIME

LAFAYETTE GRINDING CORPORATION
118 Banker St. Brooklyn 22, N.Y. EVergreen 8-5973

NATIONALLY ADVERTISED

Specialty item, for sale. Due to owner's death. Punch press dies, tools, unassembled parts, customer list, circulars, and cartons. Manufacturing discontinued April 1952.

CORLIN MANUFACTURING CO.
3201 Clinton Ave., Minneapolis 8, Minn.

WANTED
HARDENING FURNACE

Muffle type—neutral atmosphere—capacity 25 pounds per hour maximum for treating of high carbon and stainless steel. Also, one ammonia dissociator—250 C.F.H. capacity—to be used with the above furnace. Reply to:

ROOM 2260, 50 CHURCH ST., NEW YORK, N. Y.

MACHINERY WANTED
Highest prices paid for late type machine tools.
Write — wire — phone
J&L MACHINERY & SUPPLY CO.
7906 Mack, Detroit, Mich.

We're Ready NOW for All Types of

PRODUCTION MACHINING

of

STEEL, STAINLESS STEEL, BRASS, ALUMINUM, etc.

We have open capacity for both multiple spindle automatic screw machine work and Universal Turret Lathe products. Our equipment is all modern and our personnel is of the finest. We are well equipped for all second operations; milling, drilling, etc. and offer a complete service including Heat Treating, Plating & Grinding.

Send Blue Print for Quotation
Ask for Illustrated Folder

Production Machinists

STRYKER MACHINE PRODUCTS CO.
186 John Fitch Way Trenton, N. J.

BEVELED GEARS

Manufacturer has some available time for straight cut beveled gear work running from 1½" to 20", depending upon ratio, 4 pitch to 24 pitch. Equipped to handle coniflex or straight bevel tooth if required.

SIER-BATH GEAR & PUMP CO., INC.
9252 HUDSON BOULEVARD
NORTH BERGEN, NEW JERSEY

WANTED
Blanchard No. 11 Grinder

In good operating condition. Advise fully condition and location in reply.

FERSON OPTICAL COMPANY INC.
Biloxi, Mississippi

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them
GENERAL PATTERN WORKS
2233 Ruck Street Cincinnati, Ohio

DID YOU SEE OUR FULL PAGE AD IN LAST ISSUE?

JOSEPH BEHR & SONS
ROCKFORD, ILL.

WATCH FOR US IN THE NEXT ISSUE

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

AUTOMATIC, #00G Brown & Sharpe, M.D.
AUTOMATIC, Cleveland Model #B-1½" Spl. Spdl.
AUTOMATIC, Semi #2 B & S Wire Feed, 1" screw.

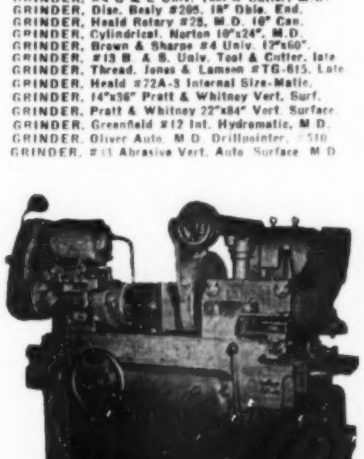
BALANCER, Anderson Bros. 14"x64". Roto-Checker.
BORING MILL, 24" Bullard M.D., V.T.L.
BORING MILL, 36" Bullard M.D., V.T.L.
BORING MILL, 36"x44" Niles Vert, M.D., Side Head
BORING MILL, 10' Cincl.-Vert., M.D. 2 heads.
BORING MILL, 2¼" Lucas Horiz., M.D.
BORING MILL, Lucas Horiz. 3" Bar, M.D.
BORING MILL, Giddings & L. #6 Horiz. 3½" Bar.
BARRELS, Tumbling Lusomatic, Schutte & Koetring.
BROACH, #3 LaPointe Horiz. 30" Str. M.D.

COMPRESSOR, Ingersoll Rand ER-1, 10 HP, M.D.
COMP., 15 HP, 10 HP, Gardner Denver, M.D., New
COMPRESSOR, C-P 50 HP., M.D., 10x10, 278 CFM
COM., Ing.-Rand ER-1, 100 HP Syn. M.D.
CRANE, OET Ricker 2 tons 11'9" span.
CRANE, Canton #8 Portable Gooseneck 3 ton cap.
CHIP WRINGER, 20" Tolhurst M.D., Late.
GAS CUTTER, Airco #4 & #10 DB Radiagraph.

RADIAL DRILL, 3' 9" Mueller, M.D.
RADIAL DRILL, 4'x11" American, M.D.
RADIAL DRILL, 5'x19" Cincinnati-Bickford, M.D.
RADIAL DRILL, 5'x17" Cincl.-Bickford Super Service.
RADIAL DRILL, 6'x15" Cincinnati-Bickford, M.D.
RADIAL DRILL, 30" Walker Turner M.D. Late
DRILL, Fosdick 10", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D. #4 M.T., M.D.
DRILL, #121 Baker Auto., S.S. Cam Operated.
DRILL, Deep Hole, Avey-Draulic #2, M.D.
DRILL, Deep Hole, Pratt Whitney #2 Gun Barrel.
DRILL, Edlund #2B, 3 spdle, #2 M.T., 16".
DRILL, 4 & 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, 4 Sp. Barnes H.D., M.D. #4 M.T., P.F.
DRILL, Cincinnati 21" with Tapping Attach. M.D.
DRILL, Natco Multiple Spdle, #12, #1 M.T., M.D.
DRILL PRESSES, Leland Gifford #1MS, 1, 2, 3, 4
DRILL PRESS, #2MS Buffalo Forge single spindle
DRILL, Barnes, 21" S.S. #4 M.T., 1¾" cap.
DRILL PRESS, #25 Foote-Burt S.S. 24", #5 M.T.
DRILLS, #14, #15, #16, #19 BuWalo Forge, M.D.
DEEPFREEZE Motor Products 40 below zero.
DEMAGNETIZER, SB-411 Magnaflux, late type.

FACING HEADS, 20" & 24" Mummert-Dixon.
FILER, #11-S Cochrane Bly Auto Saw Filer.
FILER, Type P4, Oliver Floor Type, M.D.
FURNACE, Westinghouse Elec. 18 KW, 2100° F. cap.
FURNACE, Machler Steam Oven, Serial #3543.

GRINDER, M.D. Sanford Surf. 8"x12" cap., New.
GRINDER, #1 Wilmarth Norman Hand Surf., 6"x12".
GRINDER, #2 Imperial Univ. Tool & Cutter, New
GRINDER, #2 Brown & Sharpe Sur. 6"x18" cap., M.D.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Disc, Besly #20S, 18" Dble. End.
GRINDER, Heald Rotary #25, M.D. 10" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, #13 B & S, Univ. Tool & Cutter, late
GRINDER, Thread, Jones & Lamson #TG-615, Late
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, 14"x36" Pratt & Whitney Vert. Surf.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, Oliver Auto. M.D. Drillpointer, #510
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.



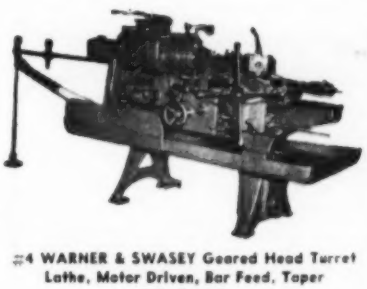
LANDIS 6 x 18 Hyd. Cyl. Grinder, Type C. Serial #29196.

GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Diamond Snagging 10 HP, 24"x4½".
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, Landis 6"x18" Hyd. Cyl. late type, M.D.
GRINDER, Rollers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterholm Disc, 24" cap.
GRINDER, 30" Ingersoll Tub Face Mill, M.D.
GRINDER #79-72" Gardner Vert. Spindle, Late.
PROFILE GRINDER, Studer Type PSM, M.D., late.
GEAR SHAPER, Fellows #6 High Speed, M.D.
GEAR SHAPER, Fellows #7 High Speed, M.D.

HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 200# Rubber Cushioned Helve
HEADER, Manville #1 S.S.S.D. Cold 3/16".
INDUCTION HEATER, 16 KVA Ecco Hi Frequency
INDUCTION HEATER, 30 KW Lepel, Late Type
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #5 Mitts & Merrill, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

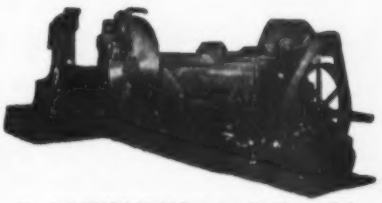
DISC GRINDERS
Osterholm 37" Wheel Diameter Disc Grinder. 40 HP. TEFC 3/60/440 spindle motor drive. 24" capacity.



#4 WARNER & SWASEY Geared Head Turret Lathe, Motor Driven, Bar Feed, Taper Attachment.

LATHE, So-Swing 8"x108", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9"x13" Geared Head Prod.
LATHE, Hendey 12"x5' Q.C.G. Taper Attach. M.D.
LATHE, LaBlond 14"x8', Q.C.G. M.D.
LATHE, Hendey 14"x8' Q.C.G. Taper Attach, M.D.
LATHE, American 16"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 16"x7' Q.C.G., M.D.
LATHE, American 18"x10' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Hendey 20"x10' Q.C.G., Taper Att. M.D.
LATHE, Reed-Prentice 20"x10' Grd. Hd. M.D.
LATHE, LaBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x12' Boye & Emmes Gd. Hd., T.A., Late
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LaBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Lodge & Shipley 26"x14', Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x16' Niles Timesaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x10' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Buffing Dble. End #WM75, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #4DE Potter & Johnston Auto., 1942
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #2 Cincl. Acme Univ. Geared Head
LATHE, Turret, #3A Warner & Swasey Univ. M.D.
LIFT TRUCKS, Baker 1 & 2 ton, Platform & Fork

MILL, #4 Burke Motor Driven, Late, M.D.
MILL, #2 Pratt & Whitney Prod. 3 Duplex, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #6Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cincl. Horiz. #3, #4, #5 High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-B Cincl. Vert. Prod. Late, M.D.
MLUT-MILLER, U.S. Tool #MM-1-6 Auto. Prod.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILL, #2SP Van Norman Horiz. M.D., Late.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.



No. 700 ESPEN LUCAS Hydraulic Heavy Duty Cut-off Saw, new 1945.

MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cincl. Vertical HI Power, M.D.
MILL, #5C Becker Vert. Die Sinker, M.D.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 100 K.W.

NIBBLER, Gray Turret Type ¼"x24" cap. M.D.
THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Lees-Bradner #40A Automatic.
THREAD MILLER, Pin-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.

PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x30"x12' A.C., M.D.
POWER PRESS, Bliss #184 Open Back, M.D.
POWER PRESS, Bliss #1A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x26" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #163-B Straight Side Dble. Crank 45 tons, M.D.
PRESS #5 Johnson OBI, 88 tons, new.
PRESS, #7A Thomas O.B.I. 60 ton cap.
PRESS, #103 Toledo Toggle Drawing, M.D.
PRESS, 135 ton Clearing Single Crank 8" Str., Late.
PRESS, 70H Drake Hyd. Arbor, New.
PRESS, #78½ Bliss S.S. 9½ Str. M.D.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Bliss #1S, #19, #20, #21, OBI, A.C., M.D.
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 68 C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #88 Whitney Deep Thr. 24", feed.
PRESS, P2, P3 Ferracute M.D. Roll feed.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #46 Buffalo Forge Vert. Cap. 1"x1¾" M.D
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hacker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End. 24" Thr. 1" thru 1".
PUNCH, H & J #5 Sgle. end. 48" Thr. 2" thru 1½".

RIVET SETTER, ⅝" cap. Penn. Tubular Rivet.
ROLLS, Bertsch Pyramid 18'x1⅝" cap., M.D., Late.
ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, 72"x¼" Lown Initial M.D., New.
ROLLS, #2 Buffalo Forge Vert. Angle, Bending, New.

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #4B Marvel Hack Saw 6"x6" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x6" cap., M.D.
SAW, Band, Tannewitz GH-36" High Speed, M.D.
SAW, V-26 DoAll Contour Band, Late.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table
SHAPER, G & E 24", high duty, back geared, M.D.
SHAPER, 32" Cincl. B.G., Motor driven, H.D.
SHAPER, Morton 36" Draw-Cut, 4-Speed, M.D.
SHEAR, #642 Niagara 42"x½" cap., 15° cap., M.D.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary 60" Throat, 10 ga.
SHEAR, 10' x 10 ga. Wysong & Miles, M.D., New.
SHEAR, #8E Niagara M.D. 8"x3/16" cap. M.D.
SCREW SLOTTER, #2 Waterbury Farrel Auto. M.D.
SLOTTER, 12" New Haven Vertical, M.D.
SPRU CUTTER, Milwaukee 50 tons, 2½ cap. M.D
SURFACE PLATES & TABLES, all sizes.

TAPPER #1 CAM Haskins, Motor Driven, Late.
TAPPER, #1 Bakewell (Warner & Swasey) Late.
TRUCK, 2000 lb. Hyster Fork Lift, 9' Model QT-20.
TRUCK, 4000 lbs. LT-44 Towmotor Fork Lift 9'.
BRINELL, Tester Machine, Type UKS500M, Steel City.
BRINELL, Tester Machine, Type 600R, Steel City.

WELDER, 500 amp. Westinghouse Flexarc A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 200 KVA Federal, Projection.
WELDER, 75 KVA Federal, M.D., Spot.
WIRE STITCHER, Merrion and Acme, M.D.

OVER 2000 MACHINE TOOLS AVAILABLE IN STOCK

WHY SEARCH?

WE CAN SUPPLY YOU WITH ALL YOUR MACHINE TOOL NEEDS

OVER 30 YEARS EXPERIENCE

AUTOMATICS

5/16" No. 00G Brown & Sharpe
1¼" Conomatic 8 spindle
3¼" & 3¾" Cleveland Mod. A
7½" Baird 6 spdl. chucker
14"x33" & 20"x25" Fay
Gisholt Simplimatics
8" 6 spindle Bullard "A" Multaumatic

BROACHES

5 ton, 40" Foote Burt duplex surface
10 ton, 56", No. 3XA Oilgear
12 ton, No. V2 American vertical
15 ton, 48", No. H10-48 American
18 ton, 42", No. V42 American

DRILLS

21" & 24" Cincinnati
24" Buffalo RPMster
Nos. 217, 310 & 321 Baker
No. 36HO Baker, index table
No. B250H Natco, No. 5 taper
3' Dresses Simplex radial
3½' American Sens. radial
12 spindle No. 12 Natco multiple
12 spindle No. 39 Natco rail
12 spindle No. 10 Defiance rail
7 spindle Moline Holehog
30 spindle No. 2 Baush
34 spindle No. A16 Natco
No. 7½H-14 Baker two way

COMPLETE MACHINERY SERVICE

GEAR CUTTERS

Type A & No. 12 Barber Colman
Nos. 1 & 5A Lees Bradner
No. 12H Gould & Eberhardt
16" Cincinnati hobber
24", No. 3 Farwell hobber
No. 130 Cleveland Rigidhobber
72" Schuchardt & Shutte hob
72" Westinghouse hobber
4" Gleason spiral bevel
No. 13 Gleason gear tester
10" Pratt & Whitney gear grinder
8" & 12" Red Ring gear shavers
24"x12" Flather auto. spur
Cimatool tooth rounders

GRINDERS

4"x12" Landis type H
10"x18" & 10"x36" Norton Semi-Auto.
No. 2 Cincinnati centerless
21", No. 6-21-1 Besly opposed disc
22", No. 228 Hanchett opposed disc
23", No. 84 Gardner opposed disc
53", No. 24 Gardner opposed disc
No. 72 Heald Sizematic & Gagematic
Nos. 5, 16A, 16-28 & 24-36 Bryant
No. 42 Van Norman radius
8"x24", No. 78 Wil. & Mor. surface
12" & 16", No. 22 Heald rotary surf.
16"x42" Landis hydraulic crank
No. 2 Brown & Sharpe universal

MONEY BACK GUARANTEE

LATHES, TURRET

1½", No. 601DD Oster
2", No. 5W Acme
2½", No. 5 Gisholt
36" Rogers vertical
36" Bullard New Era vertical

MILLERS

No. 2A Sundstrand Electromil
18" & 24" Cincinnati duplex
No. 4-36 Cincinnati Hydromatic
No. 2 Cincinnati plain
No. 3R Milwaukee plain
Nos. 32 & 33 Kempsmith Mfg.
Nos. 4, 6 & CT36 Lees Bradner thread
4", No. M80 Taylor & Fenn spline

MISCELLANEOUS

AIR COMPRESSOR. 1500' Worthington
BORING MILL. 4" D. & H. floor type
BORING MILL. 72" N.B.P. vertical
COMPARATOR. 20" Portman
HONES. Nos. 172 & 2610 Barnes
KEYSEATERS. Nos. 3 & 4 Mitts & Merrill
LAPPER. No. 10U Norton
PLANER. 30"x30"x10' Cincinnati
PLANER. 36"x36"x10' Niles Bement Pond
SHAPER. 24" American Auto-Oiled
SHAPER. 26" Morton draw-cut
SWAGER. No. 154 Etna
SHEAR. 4'x3/16" Bertsch gap
UPSETTER. 3" National air clutch

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MILES MACHINERY COMPANY

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Phone Saginaw 2-3105

Botwinik Saves You Time, Money, and Man-Hours!

BORING MILLS—HORIZONTAL

Fosdick 3½" bar—Table 24"x50"—Outboard support—v-belt—MD

Landis 3½" bar Floor Type—Vertical travel 60"—Verniers—Outboard support—MD

Landis 4" bar Floor Type—Vertical travel 54"—Outboard support—MD

Fisher 5" bar Floor Type—Vertical travel 55"—Horizontal travel 50"—MD

BORING MILLS—VERTICAL

Bullard 24", 36", 42" and 54" Turrets—Side heads—MD

Niles 38"/44" with side head—3-jaw chuck table—MD

Betts 8'—2 swivel heads—69" under cross rail—MD

Cincinnati 10'—Massive Type—2 swivel heads—MD

MISCELLANEOUS

Bertsch 1⅜" x 18' Pyramid Bending Roll—100 Hp Main Drive and 50 HP elevating motor—1944 machine

(3) Sleeper & Hartley Series 310 Flexible Casing Coilers—V-belt MD—Reels & stands

Giddings & Lewis #00T Horizontal Jig Miller—Table 18"x26"—Table cross travel 24" Spindle speeds 30 to 2000 RPM—MD—1947 machine

Cincinnati-Bickford 7' 22" Master Type Radial Drill—24 speed head—AC MD

Landis 14" x 72" Type LC Universal Grinder—3-motor drive—Late Type

Heald #72A Universal Internal Grinder—Swing 26" Sizing bracket—MD—1943 machine

Blanchard #16 Rotary Surface Grinder—30" chuck—Rectifier—MD

Norton #2 Universal Tool & Cutter Grinder—Combination attch.—Internal spindle—MD—1942 machine

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Bullard 24" V.T.L., Spiral Drive
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King 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
Niles-Bement-Pond 60" Vertical
New 3" Horizontal Boring Mills

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Brand New Radials
American 6'x15" Universal
Baker No. 321 Vertical Boring & Drill
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Buffalo #2 Motor Spindle, No. 16 4 Spindle
Buffalo: Power No. 41, No. 42
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Cincinnati Bickford 6'x15" cal.
Natco #12 20 spindle drill
24" Sibley Sliding head
New Geared Box Col. Drills 24'
Foote-Burt #25 3" capacity
Leland Gifford 2 LMS, 3 MS

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Gorton #1A, ME. Decker G1, GK2
Preis—UE3—2 dimensional
Taylor-Hobson 3 dimensional Pantograph
T.M.A.—G2 2 Dim.

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Barber-Colman Mod. SHS. Sharpener
Barber-Colman #2, #12 (3)
Fellows High Speed Shapers 712, 725, 71, 7
Fellows #20M Redliner
Flather 72" Cutter
Gleason #2 Surface Hardener
Gleason #3 Spiral, #3 Straight Bevel
Gould & Eberhardt 36" Cutter
Michigan Gear Finisher 24" cap., 862-24A
National Broach Red Ring Lapper, Finisher
Schuchardt & Shutte #1 Hobber

GRINDERS, MISCELLANEOUS

B&S #2 Universal 14"x28"
Brown & Sharpe #5, 3"x18" Cylindrical
Bryant #5. Internal, chucking, 16A16
Cincinnati 6x18" Hyd. #4—Centerless
Grenby Models 1G1 & 1G2—Internal
Gorton Ped. Type Tool Grinder
Heald #73 Internal Centerless, Sizematic
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic
Landis 6"x30" Type C Cyl., 10x24 Univ. 10x30
Norton No. 2, Tool & Cutter
Norton Type C 6"x18" Semi-Automatic cyl.
Norton 10"x18" Type C cylindrical
Norton 14"x96" cyl., 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer
Pratt & Whitney Radius Model R6
Sellers 6T Tool, K.O. Lee tool
Van Norman #666 Crankshaft
Wicaco Internal

NEW IN STOCK

Air Hydraulic Presses — Arbor Presses #6C Famco — Band Saws Kalamazoo — Famco 6x12"—Drill Presses all sizes—Hydraulic Press Northern 20 Ton — Injection Molders, 1 ounce — Power Presses, OBI, 1, 4, 4½, 5, 7½, 10, 15, 20, 30, 55, 85 ton—Shapers, 7", 8", 14", 18" Shaperite—Shears, Foot 22" to 8', 16 & 18 ga.—Shears Power 3'x18 gauge to 10' x 10 ga.—Welders Arc Seam Spot all sizes Motors, Grinders, Buffers.

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Brown & Sharpe (4) Model 2G, serial No's. 8500 & 11500 series, 1¼", 1½" capacity
Brown & Sharpe (10) Model 0G, serial No's. 9600 & 10700 series, ⅝" capacity.
Brown & Sharpe (6) Model 00G, serial No's. 14, 15, 1600 series, ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland, Model AA-11, Serial #36586.
Cleveland, Model B, Serial #42618/843, 1-1/16" capacity.
Conomatic 4 Spindle, Serial 2309FF, 1½"
Conomatic 8 spindle, serial No. 3947VB 1⅝"
New Britain Gridley 61 6 Spindle, Serial No. 25410, 1⅜" capacity.

GRINDERS, SURFACE

New 8x24" Hyd. Feed, 10x18", 6x18"
Abrasive 8x24", #33 Vert. & #34
Blanchard #16, 26" Mag. Chuck
Heald 22—12" chuck, Arter 12"
Norton 6x18" Hydraulic Vertical
Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vertical
Reid 11x36 Motor in Base
Taft Pierce #1 Precision

LATHES

American 14"x30", Bridgeford 36"x20', 32"x16'
Gisholt Simplimatic 18"x16½", 2 Tables
Hendey 12"x42" and 12x30", 1941, 16x66"
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed, 19x42"
Lipe-Carbo 12"x18" (2)
Lodge & Shipley #3A, #3 Duomatics
Pratt & Whitney 16"x60—Late
New 16, 18, 20", 28" Immediate Del.
New Tool Makers 10x24", South Bend 9"
Reid Small Piece #9WSL
Rivett Model 918 Precision, Mod. 715
Sebastian 12"x4' G.H., Sheldon 12"
Sundstrand 8x15", 15' Stub
Wickes 32"x35' Geared Head

MILLS, PLAIN, UNIV. PROD.

Brand New Universal Mills No. 1, No. 2
Archdale Plain, 14" Production
Brown & Sharpe #3B Plain. Late, 3A, 21, #2L
Cinn. No. 3, 4 Plain Spd., 18" Manufacturing
Kent Owens 1V, 1-8, 1-14, 1M
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Univ., 2H Plain.
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ. Dividing Head

MILLS, VERTICAL

Brand New Vertical Mills
Cincinnati 4 Spindle Vertical—Profile
Cincinnati 2 Spindle Hydromatic
Cincinnati (2)—1-18 Plain Automatic
Cincinnati #3, #4 hi-power, 08 Vertical
Cleveland No. 1, table 8"x32"
Morey #12M Profiler, 2 sp.
Pratt & Whitney Profiler 12B, 2 sp

PRESSES

Bliss No. 1 Double Action Drawing Press
Bliss 645, 650 Hi-Production Presses
Bliss 18, 19, 21, OBI, 58, 62, 162, OB.
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Horning, 15 Ton
Niagara A1¾, O.B.I., Niagara No. 27
Stokes Tablet Press, type R, Late
Toledo 92½c Double Crank 43x23" bed
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, LJ #3
Z & H #4½, O.B.I. 20 Ton

TURRET LATHES

Acme 6W Fax 2-9/16" Cap. #2 Cross Slid. Turret
Bardons & Oliver #2, 3, 5, 7, Bar Feed
Brown & Sharpe, #2 Hand, #10, 11
Denver 6 2" Shell Turret (2)
Foster #2B 2½" Cap. Morey #2G Late
Gisholt 2L, Cross Slid. Tur. #5 Bar Feed, Chuck
Gisholt Simplimatic, 18"x16½"
Gisholt 4R—9¼" hole in spindle
Libby 1H5 with threading att.—3R, 4R
Morey #2G Late
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1, #1A, 2, #4 Preselector (2)

MISCELLANEOUS

Band Saw: New, Kalamazoo
Bolt & Pipe Threader: Landis, Oster-Williams #915 Pipe & Nipple Threader
Boring Bar: Underwood 4"
Broach: 3L LaPointe Hydro. Horiz. New Klink. 6 Ton, Horizontal, 11 Ton Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"
Hand Mill: Whitney
Hoist: 5 ton capacity 7½ HP motor
Honer: Micromatic H-4, MC1H
Keyseater Davis, Baker
Oil Groover: WICACO
Planer: Niles-Bement-Pond 36x36'x10'
Rotary Table: Cincinnati, power take-off
Saw: Shaping 6x6", 13x13"
Shapers: 24" Rockford, 24", 28" Gould & Eberhardt. Cinn. 20, 24". Columbia 36"
Shears Power: Ohi 10' 3/16", 10" x 16 gauge
Vertical Milling Att. New, Bridgefield
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8 and 9 oz. Injection Moulders
125 Ton Southwark Press, Bed 96"x30". 30" stroke, 2 to 4 ft. opening
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200 Ton W.F. Hobbing Press
250 Ton Watson & Stillman 28x24"
300 Ton Watson & Stillman 24x29'
300 Ton Watson Stillman 20"x20" Platen 8" St. 19" opening
600 Ton Williams & White 42"x60"
800 Ton Williams & White 42"x60"
800 Ton W&S Hobbing Press

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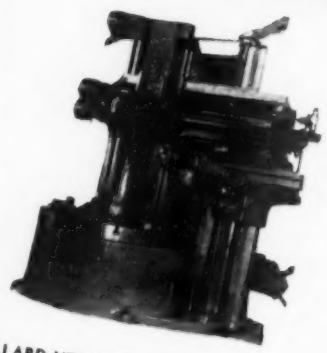

64" BULLARD VTL TYPE BORING MILL—With 5 position vertical turret head and side head. Table diameter 61"; swing 66"; maximum distance table to rail 59"; equipped with power rapid traverse and four chuck jaws, motor and controls, 3 phase, 60 cycle, 220/440 volt.

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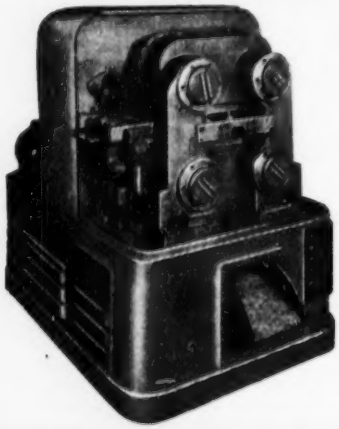

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STROKE .10" to 3"

The world's fastest high speed press. It operates at speeds up to 1800 strokes per minute. Stock is fed up to 10,000 lineal inches per minute.

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Bullard 34" New Era Vert. Turret
Gisholt 72" M.D.—2 Hd. Vertical
Gidding & Lewis #90T Horiz. Table type, 2000 RPM spindle speed
Cinn. 10' M.D. 2 Hd. Vertical

GRINDERS
Cinn. No. 4 Centerless, Thru-feed
Blanchard #16A Vertical Surface
Norton 10"x36", 10"x50", 14"x96" Plain
Landis 10"x18" Hyd. M.D. Plain C

MILLERS
Rowbottom up to 32" M.D. Cam Miller
Van Norman 22LU M.D. Univ. Duplex
Potter & Johnson 2M Horiz. Auto.
Brown & Sharpe #3 M.D. Vertical

PRESSES
Henry & Wright 50 ton M.D. Dieing
Bliss No. 1½ D.A. Toggle
Clearing Model DS-1500-60, 500 Ton Double Action Press, 1942 Machine
Cleveland 400 Ton #4K Knuckle Joint

TURRET LATHES
Bardons and Oliver #2-1" Elect. Geared
Gisholt No. 4 Turret Lathe
Potter & Johnson #4D-21" M.D., H.S.
Gisholt No. 5 M.D. Ram Type Univ.

MISCELLANEOUS
DoAll 16" ML, Metal Master Band Saw
Fellows #72 M.D. High Speed Gear Shaper
Barrett #1200 Fixed Bowl Centrifugal Separator
Bliss 1225A—36" MD Gang Slitter
Dreis-Krump, 10 ft. 10 ga. Gap Sq. Shear
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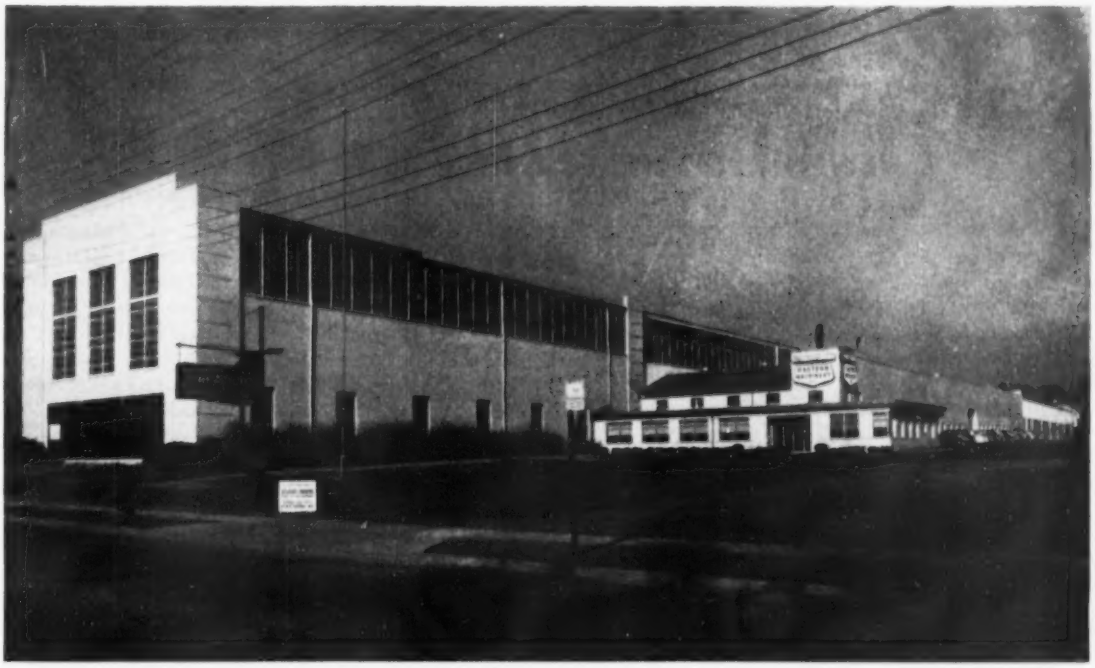

HAMMERS

1100# Chambersburg Single High Frame Steam Hammer

HONING MACHINES

H1 Micromatic Horizontal Hydrohoner m.d.
H4 Micromatic Horizontal Hydrohoner m.d.
No. 6 Barnes Twin Spindle
Model #182 Barnsdrill Hone, m.d., latest

MANUFACTURING LATHES

Model B1—¾ H.P. Blount Speed Lathe, m.d.
W. C. Lipe Carbomatic Lathe, m.d.
Colborne Mfg. Bench Type Speed Lathe, m.d.
No. 4 LeBlond Boring Lathe, 37" bed, 4" hole, latest
No. 9, No. 12, LeBlond Multi-Cut, m.d.
3½x36", 3½x80", 4x60", 8x84" LeSwing, m.d.
8x132" LeSwing, m.d., latest
9x12" Sundstrand, s.p.d.
11x18" LeBlond Rapid Production, m.d.
12x18" centers Monarch Model 5T, m.d.
17x6' LeBlond Automobile Mfg., cone
17"x8' LeBlond Rapid Production geared head lathe
17"x8' LeBlond Automobile Mfg., cone
Schauer Type NA 2B Speed Lathe, m.d., latest
Dresses 20" Full Universal Monitor Lathe
30"x10' LeBlond Turning Lathe, cone

ENGINE LATHES

Dalton Combination Lathe, Horizontal Miller, Drill Press & Vertical Miller
12"x6' Lodge & Shipley Geared Head, m.d., taper
13"x30" centers Pratt & Whitney Model B, m.d., taper
13"x5' bed Willard, cone, motorized
14"x6' American High Duty Geared head, m.d., taper
14"x6' bed Hendey Geared Head, m.d., taper
14"x6' bed Lodge & Shipley, Geared Head, m.d.
14"x6' Lodge & Shipley, cone, motorized
14"x6' Pratt & Whitney, cone
14"x6' bed LeBlond, cone
14"x6' bed Monarch
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Prentice, m.d., taper
14"x8' Sidney Geared Head, m.d.
15"x8' LeBlond, m.d., taper
16"x36" Pratt & Whitney Geared Head, m.d.
16"x6' bed Cincinnati, cone, motorized
16"x6' bed Cisco Geared Head, m.d.
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x54" Springfield, m.d.
16"x6' Lehmann Geared Head, m.d.
16"x6' Lodge & Shipley Geared Head, m.d.
16"x6' Lodge & Shipley, cone
16"x6' bed Monarch Geared Head, m.d.
16"x84" Pratt & Whitney Type B, m.d.
16"x8' Champion, cone, motorized.
16"x8' bed Reed-Prentice Heavy Duty, cone, taper
16"x8' Monarch, cone, motorized
17"x6' LeBlond Geared Head, m.d.
18"x5' LeBlond Geared Head, m.d.
18"x6' bed Lodge & Shipley, cone, motorized
18"x6'6" bed Greaves-Klusman Geared Head, m.d. in leg
18"x7' Hendey Geared Head, m.d., taper
18"x8' Champion, cone
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley geared head, m.d.
18"x8' Whitcomb-Blaisdell, geared head
18"x6'6" bed Walcott, cone, motorized
18"x10' bed Boye & Emmes, m.d.
19"x6' centers LeBlond Geared Head, m.d., taper, late
20"x8' bed American Geared Head, m.d., taper
20"x8' Cisco, cone
20"x8' bed Greaves Klusman Geared Head, m.d. in leg
20"x8' bed Boye & Emmes, m.d.
20"x10' bed Lodge & Shipley Geared Head, m.d.
20"x10' Sidney Geared Head, m.d.
20"x10'6" Boye & Emmes, cone, motorized
20"x18' bed Springfield Geared Head, m.d., latest
21"x10' LeBlond Geared Head, m.d.
23"x12' LeBlond Geared Head, m.d., taper
23"x12' bed LeBlond, cone, motorized
23"x14' bed LeBlond Geared Head, m.d., taper
24"x12' bed Boye & Emmes, belt drive
24"x12' Bridgeford Geared Head, m.d., taper
24"x16' bed American, cone, motorized
24"x24' bed Lodge & Shipley Geared Head, m.d. taper
25"x10' bed LeBlond Geared Head, m.d., taper
25"x12' bed Geared Head, LeBlond, m.d., taper
25"-50"x8' centers LeBlond Gap Lathe, m.d.
28"x12'6" Niles-Bement-Pond, m.d., taper
30"x13'6" bed Niles-Bement-Pond, m.d.
30"-44"x15' bed American Geared Head, m.d.
36"x12' bed Lodge & Shipley, Selec. Head, m.d.
36"x16' LeBlond Model T-3 Geared Head, s.p.d.
36"x16' bed LeBlond Geared head, m.d.
36"x36' bed American Triple Geared Internal Face Plate Drive, m.d., taper
42" Putnam (raised to swing 56½") x 20' bed Geared Head, m.d., 11'8" centers
30" raised to swing 44"x15' bed American, m.d.

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BETTS 15' x 10' x 36' PLANER—4 HEADS

Capacity 15' 2" wide x 10' 3" high x 36' long; Bed depth 27"; Length 69' 4"; distance between cross braces 0' 24"; Ways, one flat one Vee angle of Vee 120 Deg; ℄ to ℄ of ways 82"; Table width 12' 0"; depth over Vee 16"; Two piece table 19' long each; Driven by rack, 17" wide, 2-1/10 cir. pitch; Weight approx. 415,000#, BOX TABLE; DC Drive, 4 heads, 2 Rail, 2 Side, Direct Shaft Conn.

NEWTON 110" HEAVY DUTY PLANER TYPE MILLER

ADJUSTABLE RAIL—4 HEADS

With 2 NON-SWIVELING UNIT DRIVE RAIL HEADS AND TWO SWIVELING SIDE HEADS. (1) Right Angle Milling attachment for operation on either vertical head. (1) Special unit drive head for milling bearing seats in frames. Width of work table—103". Length of work table on working surface 28'. Thickness of work table 14". Maximum width between horizontal face mills 96"; minimum width between horizontal face mills 68"; maximum distance top of table to cutter on vertical spindle 87"; diameter of spindle thru driving gears 4½"; end adjustment to each spindle 14"; diameter of spindle quills 11"; width of face of cross rail 24"; width of face of each upright 24"; width of base 74"; cutting speed changes, ranging from 10½ to 94 RPM. Approx. overall width of machine 20'—approx. overall length of machine 71' 6". Approx. weight 235,000#. ADJUSTABLE RAIL. All Push Button.

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AUTOMATICS
3½" RA-4 Acme Gridley. 1940
2" Model A Cleveland. 1941
1⅝" Model A Cleveland. 1943
1-1/16" Model A Cleveland. 1943
No. 00G Brown & Sharpe. 1941

BOREMATICS
No. 49 Heald Single End. 1941

BROACHES
HP-100 La Pointe Horiz. Broach. 1945
5 Ton 36" Stroke La Pointe Vertical. 1942

DRILLS
No. C225H Natco Multi. Spdl. 1942
Ma-6 Avey 6 Spindle, H.F. 1943.
Allen Single Spindle Drill & Tapper. 1942
No. 2 LMS Leland-Gifford. H.F. 1942

GEAR EQUIPMENT
No. 7 Gleason "Revex" Rougher. 1943
No. 9 Gleason Revacycle Generator. 1940
No. 72 Fellows H.S. Gear Shaper. 1942
10" Pratt & Whitney Hyd. Gear Grinder. '42

GRINDERS, CYLINDRICAL
14"x168" Norton Plain Type "C". 1942
12"x60" Fitchburg Plain Hyd. 1942
12"x48" Cincinnati Univ. Grinder. 1942
10"x18" Norton Plain Type "C". 1940
6"x30" No. 12 B&S Hydraulic. 1940
No. 5 Brown & Sharpe Plain. 1941
No. 2 Cincinnati Centerless Grinder. 1944

GRINDERS, INTERNAL
No. 72-A3 Heald Pinin Hydraulic. 1942
No. 24-36 Bryant Hydraulic. 1943
No. 16 CP 16 Bryant Hydraulic. 1942
No. 16-16 Bryant Hydraulic. 1942
No. 172 Heald Hydraulic. Gap. 1940
No. 112 Rivett Universal Internal. 1940

GRINDERS, MISCELLANEOUS
Cincinnati Centerless Lapper. 1942.
No. 600 UK Hanchett Face Grinder. 1946.
No. 35 Excello Univ. Thread. 1940.
HRS Barber-Colman. 1942.

GUN BARREL MACHINES
No. ½ B x 50 P & W Reamer. Latest
No. ½ B x 30 P & W Reamer. Latest.
No. ½ B x 50 P & W Rifler. Latest.

LATHES, ENGINE
36"x296" American Geared Head, M.D.
27"x192" Niles Timesaver, 2 Carr. 1941
27"x132" Monarch Auto. Sizing. 1942.
27"x96" Niles Timesaver. 1940
26"x180" Betts Bridgeford. 1940
26"x96" Betts Bridgeford. 1940
10"x20" EE Monarch Toolmakers. 1943

LATHES, PRODUCTION
No. 5D Potter & Johnston Automatic. 1943
8"x84" Lo-Swing Semi-automatic. 1941
Lipe Carbo-Matic Lathe. 1942

LATHES, TURRET
No. 1A Warner & Swasey Saddle Type. 1941
No. 1L Gisholt Universal Saddle Type. 1942
No. 3R Gisholt Universal Saddle Type. 1943
No. H5 Libby Universal Saddle Type. 1939
No. 5 Gisholt Universal Ram Type. 1942
No. 6R Denver Universal Ram Type. 1942

MILLS, PRODUCTION
M-18 Milwaukee. 1943
No. 1224 Milwaukee Simplex. 1943
No. 0B Cincinnati Vertical. 1943

MILLS, TOOL ROOM
No. 3 Cincinnati Vertical, M.S. D.T. 1940
No. 3 Van Norman Plain. 1942
No. 2 MI Cincinnati Plain. 1951
No. 2I Van Norman Plain. 1942

SHAPERS
16" Garnetti Universal Shaper. New.
20" Garnetti Universal Shaper. New.
18" Brook Universal Shaper. New.
24" Garnetti Universal Shaper. New.

PRESSES
630 Ton Verson Dbl. Act. Eccentric. 1940
No. 166 Toledo Toggle Press.

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BEMENT MILES 18" SLOTTER with 3" dia. spindle. M.D.

GOULD & EBERHARD 36" Gear Cutter M.D.

BROWN & SHARPE #5—48" Gear Cutter, M.D.

BINSEE MACHINERY COMPANY HORIZONTAL BORING MILL. Table 30"x 64". Quantity of boring bars.

GRAY 36"x36"x8' Planer, 2 heads on cross rail; motor driven. Thoroughly rebuilt and guaranteed.

FOOTE-BURT #25—24" Heavy duty Vertical Drill #5 M.T. Motorized.

LANDIS 10"x36" Plain, M.D. Also Planer type GRINDER 16" x 36".

"BEMENT" 26" STROKE TRAVERSING HEAD SHAPER. 48" travel to ram. 2 tables. (PLANER SHAPER)

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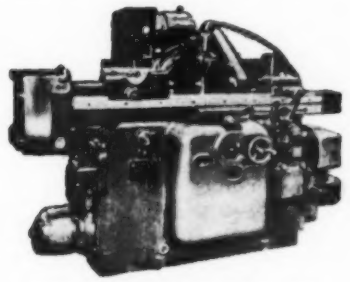
MONARCH Model EE 10"x20" Toolroom Lathes
MONARCH Model N G.H. Engine Lathe 33½"x120" cc
LODGE & SHIPLEY G.H. Engine Lathe 24"-27"x16' cc
AMERICAN G.H. Engine Lathe 24"-27"x96" cc
AXELSON G.H. 24-Sp. Engine Lathe 16"x54" cc
LEHMANN G.H. 16-Sp. Engine Lathe 19"-20"x82" cc
AMERICAN G.H. Engine Lathe 16"-18½"x30" cc
MONARCH Model 5T Multi-Tool Mfg. Lathe 12"x18" cc
HARDINGE 2nd Operation Lathe 1" Cap.



JONES & LAMSON MODEL TG 12 x 45"
AUTOMATIC THREAD GRINDER

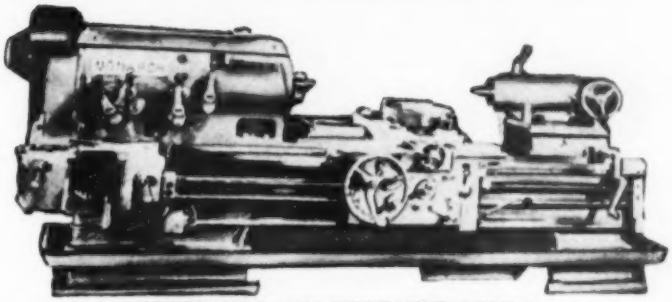
TURRET LATHES

WARNER & SWASEY Mod. 2 G.H. Ram Type 1" Cap.
WARNER & SWASEY Mod. 2 G.H. Ram Type 1½" Cap.
BARDONS & OLIVER Mod. 2 G.H. Ram Type 1" Cap.
BARDONS & OLIVER Mod 3 G.H. Ram Type 1½" Cap.
WARNER & SWASEY Mod 3 G.H. Ram Type 1½" Cap
GISHOLT Mod 3 G.H. Ram Type 1½" Cap.
WARNER & SWASEY Mod 5 G.H. Ram Type 2½" Cap.
GISHOLT Mod 5 G.H. Ram Type 2½" Cap.
FOSTER Mod 1B Univ. G.H. Saddle Type 2-9 1/16" Cap.

GRINDERS

BROWN & SHARPE Model 2 Internal-External Universal Grinder 14"x30" Cap.
CINCINNATI Uni. Hydr. Cyl. Int.-Ext. Grinder 12"x 36" Cap.
ROTOREX Model 101-A Universal T & C Grinder, w/Int. Att.
COVEL Model 9/A Univ. T & C Grinder
JONES & LAMSON Model TG-12x45" Auto. Thread Grinder
EXCELLO Model 35 Thread Grinder
EXCELLO Model 31 Thread Grinder

CINCINNATI 12" x 36" HYDRAULIC UNIVERSAL GRINDING MACHINE INT. EXT.



MONARCH 33½" x 120" ENGINE LATHE—MODEL N

LAPPING MACHINES

ULTRALAP Model 10 Vert. Lapper

TAPPING MACHINES

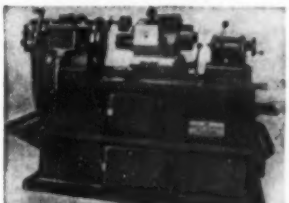
BAKEWELL Model 2 Tapper ⅜"—2½" Cap.

MILLING MACHINES (Horizontal)

VAN NORMAN Model 36 Ram Type Duplex
NEW CENTEC Model 2A Universal With Vert. Att.
MILWAUKEE No. 1-B Universal Miller
BROWN & SHARPE Mod 10 Auto. Production Miller
CINCINNATI Mod 00 Plain Horiz. Auto., Cycle

MILLING MACHINES (Thread)

PRATT & WHITNEY Model C-M-1804 Thread Miller 4½"x36"
HANSON & WHITNEY Univ. Semi-Auto. Thread Miller 10"x48"



HANSON & WHITNEY UNIVERSAL SEMI-AUTOMATIC THREAD MILLING MACHINE
10" x 48"

MISCELANEOUS

FAMCO #6, 8, 10, 12, 15 Foot Presses (NEW)
EXCELSIOR #6, 8, 10, 12, 15 Foot Presses (NEW)
ARBOR PRESSES (NEW)

VERTICAL MILLER

GORTON Model 8D Super Speed Vertical Miller

PRESSES

WIEDEMANN Model R11P 18 Sta. Power Turret Punch
RUESCH #2 Percussion Press
POWER PRESSES (New)

AUTOMATICS

BROWN & SHARPE Model 00G ⅝" Cap.
CLEVELAND Model A Single Spindle 9/16" Cap.
CLEVELAND Model A Single Spindle 1-1/16" Cap.
CLEVELAND Model A 1¼" Cap.
CLEVELAND Model B Single Spindle 1½"—18" Cap.

BORE-MATICS

EXCELLO Model 2112A Single End Double Spindle Hyd. Cross Slide Table

DRILLS

NEW O. M. S. R. Type T.B. 2 Radial 4'x12" Column
NEW ZEWO Universal Floor Type Radial 21"x½"
NEW CANEDY OTTO 18" Single Spindle ⅞" Cap.
NEW FAMCO 15" Bench Type Drill Presses ½" Cap.
NEW FAMCO 15" Floor Type Drill Presses ½" Cap.
MORRIS MOR-SPEED RADIAL 5'x20" Column
LELAND GIFFORD 2 Spindle 20" Drill Press

GEAR EQUIPMENT

BARBER-COLMAN Type S Gear Hobber
FELLOWS 3" Fine Pitch Shaper
GLEASON 12" Straight Bevel Generator—Finisher—Roughor
GLEASON 3" Straight Bevel Generator
GLEASON 3" Spiral Bevel Gear Generator
GLEASON 3" Bevel Gear Tester
GLEASON Model 6 Angular Hypoid Tester
GLEASON 19" Spiral Bevel Generator
BARBER-COLMAN Model 12 Hobber 12" Cap.

PROFILERS

PRATT & WHITNEY 40-Inch Profiler 2 Side Heads
PRATT & WHITNEY 30" Single Spindle

SHAPERS

HENDEY Universal H.S. Crank Shaper 12"
GOULD & EBERHARDT Industrial Shaper 20"

SHEARS

COLUMBIA 92"x¼" Cap. 18" Gap Power Shear
PEXTO 44" Geared Power Gap Shear
NIAGARA Model 412 Power Shear 12'x16 Gauge

NIAGARA #412 POWER SQUARING SHEAR
12' x 16 GAUGE

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REAL VALUE...

IN SERVICEABLE TOOLS

ESPEN LUCAS #670
Hydraulic Cold
Sawing Machine

Capacity 12" to 20" diameter.

Arranged for saw blades up to 55" diameter.

Spindle speeds from 150 to 450 RPM.

Latest Type

CAMPBELL #401 Cutamatic Wet Abrasive, M.D.; late type
DILL 15"-18" Vertical Slotter, M.D.; late type
ROCKFORD 20" H.D. Hydraulic Vertical Slotter, M.D.; late
CROSS #1 Gear Tooth Rounding Machine, M.D.; late
FISCHER #1 Oil Grooving Machine, M.D.; latest type
WATERBURY-FARREL #2 Automatic Nut Tapping Machine; M.D.; late

— and many others —

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CANAL 6-7400 • CABLE ADDRESS: WOODWORK, N. Y.

BORING MILLS
No. 32 LUCAS Horizontal Boring Mill
No. 6 GIDDINGS & LEWIS Horiz. Boring Mill
No. 45 GIDDINGS & LEWIS Horiz. Boring Mill
100" BETTS Heavy Duty Vert. Mill, 2 heads, M.D.

LATHES
14"x54" REED PRENTICE Geared Head Lathe
16"x30" LODGE & SHIPLEY Selective Geared Head Toolroom Lathe.
27"x168" LeBLOND Heavy Duty Engine Lathe
36"x16' bed AMERICAN "High Duty" Geared Hd.
42"x15' bed AMERICAN "Heavy Duty" Geared Hd.
42"x30' bed AMERICAN "Heavy Duty" Geared Hd.

GRINDERS
6"x18" CINCINNATI Plain Hyd. Cyl.—Filmatic
6"x18" LANDIS Type C Plain Hyd. Grinder
6"x18" NORTON Vertical Surface Grinder
10"x24" LANDIS Universal Grinder
16"x72" LANDIS TYPE C Plain Hyd. Grinder
No. 104 RIVETT Internal Grinders
No. 72A3 HEALD Plain Internal Grinder
No. 172 HEALD GAP Internal Grinder
No. 73 HEALD Internal Centerless Grinder

MILLING MACHINES
No. 0-8 CINCINNATI Plain Millers
Nos. 1-8 and 1-14 KENT OWENS Millers
No. 2M CINCINNATI Vertical Millers
No. 1-18 CINCINNATI Plain Prod. Miller
No. 36 VAN NORMAN Plain Ram Type Miller
No. 2 BROWN & SHARPE Light Type Plain
36"x36"x12" and 16' INGERSOLL Planer Type Milling Machines, three heads, M.D.

GEAR EQUIPMENT
#64 FELLOWS Spur Gear Shaper, M.D.
#72 FELLOWS Spur Gear Shaper, M.D.
@725A FELLOWS High Speed Gear Shaper
#12 FELLOWS Gear Shaving Machine
#36-BM GOULD & EBERHARDT Gear Rougher, M.D.

AUTO. LATHES & TURRETS
#4D POTTER & JOHNSTON AUTO. Turret Lathe
#6S POTTER & JOHNSTON AUTO. Turret Lathe
#1L GISHOLT SADDLE TYPE Univ. Turret Lathe
#3A WARNER & SWASEY Heavy Duty Univ. Turret Lathe
#3 JONES & LAMSON Ram Type Univ. Tur. Lathe
#2 ACME Univ. Saddle Type Turret Lathe

MISCELLANEOUS
4½"x36" PRATT & WHITNEY Model C Thread Miller.
4½" CONOMATIC 4-Spindle Auto. Screw Machine
3'9" CINCINNATI BICKFORD H.S. Radial Drill
PRATT & WHITNEY Upright Shaving Machine Model E-5
NATCO Multiple Spindle Drill
38" NORTON Heavy Duty Draw-Cut Shapers, 1945
24"x24"x6' GRAY DOUBLE HOUSING Planer, 2 heads, M.D., 1941
Model V-16 DOALL Contour Saw & Band Filer
No. 1½ Bx50" P & W Two Spindle Reaming Machine

WIGGLESWORTH INDUSTRIAL CORP.
203 BENT ST., CAMBRIDGE 41, MASS.-KIRKLAND 7-5242

NEW
Vertical Boring & Turning Mill

72" Table (82" swing)
2 Railheads, 1 Sidehead

Immediate Shipment from N.Y. stock

MAXWELL MACHINERY CORP.
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PL 7-3471

MODERN MACHINES

#9A Jones & Lamson Turret Lathe—new 1941 Serial #65107—Rebuilt and guaranteed
Heald #25A Rotary Surface Grinder—Serial #4577 Reconditioned and guaranteed
3'9" Column Cincinnati Bickford Radial Drill Serial #2A-41—new 1936—Rebuilt & guaranteed
72" Rebuilt King Heavy Duty Vertical Boring and Turning Mill—Serial Lot 38-#175
4½" Bar Giddings & Lewis #45 Table Type Horizontal Boring, Drilling and Milling Machine—Serial #8150.
Ingersoll Adjustable Rail Planer Type Milling Machine—Serial #3158—Reconditioned and guaranteed
#64 Fellows Gear Shaper Ser. #26113
#64A Fellows Gear Shaper—Ser. #25634
Rebuilt 6' 15" Column American Triple Purpose Radial Drill—Serial #58592.
60" Hanchett Face Grinder—Reconditioned and Guaranteed.
6D Potter & Johnston Automatic Chucking Machine Serial #70398
16" Gould & Eberhardt Shaper—Ser. #66737

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350 Waterman St., Providence, R. I.

HENDEY 14 x 54 LATHE
Late Type — 1943
Complete with Collets, Taper Attachment, Etc.
EXCELLENT CONDITION
WINSTON MACHINERY COMPANY, INC.
326 W. Ohio St. Indianapolis 2, Ind.

No. 5-B SYKES (Farrel) GEAR GENERATOR New 1945, cap. 1 to 61" dia., 18" face.
16" BULLARD MULT-AU-MATIC, 8 spindle Type D, new 1940.
BRANDT MACHINERY COMPANY
514 Empire Building, Pittsburgh 22, Pa.

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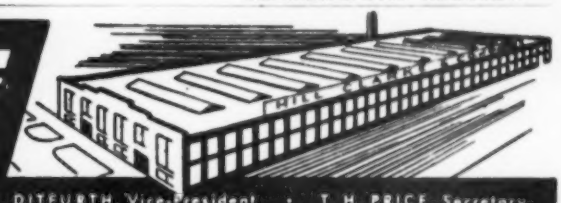
Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12" Gleason Generators, 36 BM Gould & Eberhardt Rougher, #7 Fellows Gear Shaper, #16 D. E. Whiton Machine. Write for full information.

FS-1688, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

HILL-CLARKE MACHINERY COMPANY



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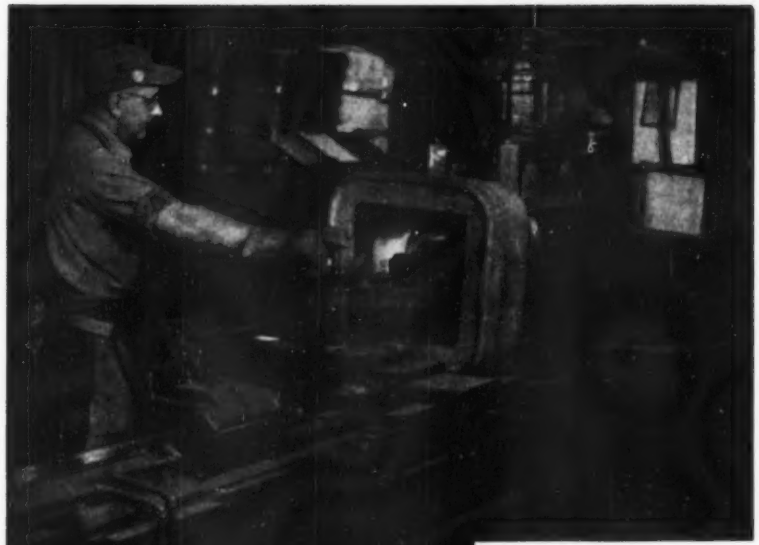

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You're Always Sure With
HILL-CLARKE

THE MAYTAG COMPANY REPORTS TWO-THIRDS GREATER PRODUCTION, easier operation and less maintenance, required with this Hill-Clarke rebuilt lathe. For 38 years MAYTAG has relied on Hill-Clarke for good, dependable used machines like this recess lathe used to center bottom of washer tub so that agitator has same all around bottom clearance.

MILLING MACHINES

54"x36"x16' Ingersoll Slab Mill
4"x9" Hanson-Whitney Thrd.
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)
12"x102" Lees Bradner Thrd. Mill

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 hds.
42"x42"x10' Cincinnati, 2 hds.
48"x36"x14' Gray, 2 hds.
48"x48"x12' Cincinnati, 2 hds.
48"x48"x12' Gray Maxi-Service
60"x48"x27' American, 4 hds.

MISCELLANEOUS

1"-2" Dia. Cap. Micro. Hor. Hone—#200
¼"-1" Dia. Cap. Micro. Hor. Hone—#H-2
42"—18 gage Economy Power Shear
75 Ton R & K Straight Side Press
3 Ton Fox Hydraulic Press
2—12"x96" Magnetic Chucks
20'x1" cap Southwark Roll
14'x⅜" cap Niles-B-Pond Roll
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
No. 0 Bakewell Tapper

FULL MONEY-BACK GUARANTEE

1. **Hill-Clarke gives you an unconditional money-back guarantee.**
2. **All machines in stock.**
3. **You can see your machine run and tested under power in our plant before purchasing.**
4. **Complete and modern facilities plus experienced craftsmen for REMANUFACTURING machine tools in our 58,000 sq. ft. plant.**
5. **A responsible organization — with 85 years' experience.**

AUTOMATICS

1-1/16" Model A Cleveland (1942)

DRILLS

1 Spdl—15" Sw—No. 2 Avey, Cam Fd.
1—Spdl—24" Sw—No. 2 MA6 Avey
2 Spdl—24" Sw—No. 3 Avey
D-31 Fox Multiple Drill, No. 2 Taper
6' Western Radial

GEAR MACHINES

No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl, Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.
8" cap Red Ring Gear Lapper

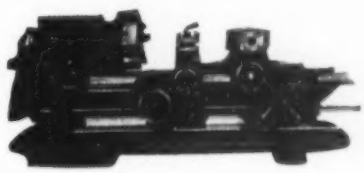
LATHES

12"x21" Fay Automatic
16"x33" R-14 Seneca Falls Auto-Lathe
13¾"x39" Centers Dimco Lathe (New)
15"x39" Centers Dimco Lathe (New)
18"x59" Centers Dimco Lathe (New)
23"x60" Centers Dimco Lathe (New)
24"x39" Centers Dimco Lathe (New)
19"x8' LeBlond Hvy. Duty Lathe
36"x18' Putnam Grd. Hd., M.D.
No. 4 Warner & Swasey Tur.-Bar Fd.
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 3AL Gisholt
No. 4A Warner & Swasey—7½" Hole—Spdl.

GRINDERS

6"x18" Norton Cylindrical (1943)
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x60" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
20"x96" centers
24"-32" Gap x 144" centers
No. A-3—12" Arter Rotary Surf.
No. 22—12" Heald Rot. Gdr. (1944)
5B Bryant Internal Grd.
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

FEATURE OF THE MONTH



THIS
No. 3 A L GISHOLT TURRET LATHE

27" Swing—6¼" Hole Thru Spindle—5'-4" Between Spindle and Turret

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FINE LATE TYPE GUARANTEED TOOLS

24"x84" centers BOYE & EMMES Heavy Duty Geared Head Engine Lathe, chuck, AC-MD.

25"/32"x96" centers AMERICAN Pacemaker Heavy Duty Engine Lathe, taper attachment, chucks, 25 HP AC motor, new 1948.

28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943.

60"x20' NILES BEMENT POND Geared Head Engine Lathe, rapid traverse.

No. 3L GISHOLT Turret Lathe, 5-1/16" hole thru spindle, new 1943.

#2 BARDONS & OLIVER Turret Lathe, bar speed, 1¼" cap. New 1944.

No. 5 GISHOLT Universal Turret Lathe, pre-selector head, bar & chuck, new 1943.

42" BULLARD Spiral Drive Vertical Turret Lathe, Serial 23800, New 1944.

No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD

No. 4 KEARNEY & TRECKER Plain Horizontal Mill, No. 50 taper, motor in base, rapid traverse.

#4H KEARNEY & TRECKER Vertical Mill New 1944.

5'-13" column CARLTON Radial Drill, AC motor in arm, 15-1500 RPM, box table.

No. 914 BAKER Heavy Duty Hydraulic Drill, No. 6 Morse taper, 15 HP motor, new 1946.

24A HEALD Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD.

14"x36" LANDIS Universal Hydraulic Cylindrical Grinder, new 1943.

36" OHIO Dreadnaught Shaper, AC-MD.

1½" LANDIS Bolt Threader, leadscrews, AC-MD.

75 Ton HENRY & WRIGHT Double Crank Dieing Machine, roll feed & scrap cutter. No. 135 CLEVELAND Rigidhobber.

1⅜" CLEVELAND Model "A" Automatic Screw Machine, new 1942.

AIR COMPRESSOR, 64 C.F. I-R Model ER-1, Late
AUTOMATIC, 1¼" 4 spin. Gridley Model G
BOLT THREADER, 1½" Williams Reliance
BORING MILL, 100" N.B.P., 2 Hds., M.D.
BORING MILL, 100" Cincl. Massive, 2 Hds., M.D.
BORING MILL, 72" King, 2 Hds., P.R.T., M.D.
BORING MILL, 72" N.B.P., 2 Hds., P.R.T., M.D.
BORING MILL, 4½" bar G. & L. No. 45, Thin.
BORING MILL, 3½" bar Giddings & Lewis #0
BORING MILL, 5" bar Lucas, Table Type
DRILLS, RADIAL, 4' Western, M.D. (2)
6' Amer., 15" col. Trip. Purp., M-on-Arm
5' Amer., 15" col. Trip. Purp., M-on-arm
5' Amer., 14" col., Trip. Purp.
5' Niles #10 Rightline, Univ., Motor-on-arm
4' Amer., 13" col. M-on-Arm
3'8" & 2½' Arboga (Swedish), Late
TABLES, RADIAL, 36"x20'x20'
DRILLS, #8D Colburn 36", 5' capty.
#3H4 Baker, 24", 3' capty.
24" Cincl. Mich., Tapping, M.D.
#2LMS Leland Gifford, Deep Hole
DRILL, MULTI, 32 spin. W-7 Bausch, 1947
FLANGERS, ⅜" and ½" McCabe (2)
GEAR CUTTER, No. 13 B. & S. Spur & Bevel
GEAR SHAPERS, Nos. 6, 61A, 64 & 64A Fellows
Nos. 7S & M61 Fellows (2)
GRINDER, SURFACE, 14"x36" P. & W.
GRINDER, 4"x18" Landis #4H, Cylindrical, Late
GRINDER, No. 6T Sellers Tool, 1942
GRINDER, Micro Internal, large capty.
GRINDER, 18"x144" Norton Cyl., M.D.
HAMMER, 1000 lb. Chambersburg Pneumatic, 1947
KEYSEATER, No. 3½ Baker, 24" str. x 4" wide
LATHES, 48"x20' eng. N.B.P., M.D.
48"x20' bed, Amer. T.A., Grd. Hd.
32"x14' bed Schumacher Boyo T.A., M.D.
28"/48"x16' bed Rahn Larmon, Gap
26"x12' Bridgeford, QCG Grd. Hd., M.D. (2)
24"x12' bed B. & E., T.A., Grd. Hd.
20"x78' Matra, T.A., New
20"x10' bed Amer. Grd. Hd. M.D.
20"x10' bed L. & S., T.A., M-in-Base
18"x10' bed L. & S., T.A., Ceco Motorized
18"x8' bed L. & S. Selective Grd. Hd., M.D.
18"x80" eng. P. & W. Motor-in-base
16"/32"x8' Harrington Gap M.D.
16"x6' & 12"x6' Headeys (2)
14"x6' bed Amer. T.A., M-in-base
10"x50" bed Sheldon, New 1946
No. 3x42" Headey Turning (1200 r.p.m.)
TURRET LATHES, No. 3A Warner & Swasey, 1943
No. 5AL Gisholt, 6¼" H.S.
No. 3 Gisholt, 1942
No. 2B Foster Univ., 3¼" Capty., Bar Timken
No. 1B Foster Univ., 2" capty. M.D.
21" Acme Universal Brass, Late
19" Libby Model A Grd. Hd.
MILLER, No. 22L Van Norman, Late
MILLER, No. 3 Cincl. HI Power, Motorized
MILLERS, Nos. 2 & 3 Cincl. HI Power Univ., M.D.
MILLER, No. 2 Stand. K. & T. Univ. #50
MILLER, No. 2 Van Norman Ram, M.D.
MILLERS, No. 2 Abene (like Van Norman) New
MILLER, No. 1½ S.K. & T. Univ., Grd. Hd.
MILLER, No. 000 B. & S. Plain, M.D., Late
MILLER, No. 0 Sundstrand Rigidmil, Hand
THREAD MILLER, 12"x60" Morey Shields, '42
PRESS, 73½ Bliss S.S., 6" stroke
PRESS, No. 58 Toledo S.S., Grd., 171 ton capty.
PRESS, #3C Bliss 30", "Stiles", Late
SQUARING SHEAR, 8'x3/16" Gen. Obi

BENNETT MACHINERY CO.
375 Allwood Road, Clifton, N. J.
Off Route 3-3, Phone Prescott 9-8996
New York Phone: LOngacre 3-1222

LATE MODEL TOOLS

American Type T-8-32 Broaches Three-way vertical hydraulic, single ram, 13"x18" table. Cap. 12,000#. MD with 7½ HP motor. 1942.

Barrett 1 ton Portable Shop Elevator Hinged type. Never used. Half price.

No. 320 "Barnesdrill" Multiple Cyl. Hyd. Hone, throat—6¼", spindle stroke 2" to 20", 5" dia. spindle. Sleeves with #4 taper. 1948.

R.A.VINE, INC.
new and used machinery
652 W. Willis Ave., Detroit 1, Mich.

ZEISEL
#2L Gisholt Univ. Turret Lathe
#2MH CINN. Horz. Mill
#12 and #22L VAN NORMAN Ram Type Millers
#2 AVEY Bis Spindle Drill, Power Feeds.
13"x30" PRATT & WHITNEY Toolroom Lathe — Taper Collets.
In Stock For Immediate Delivery
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Immediate delivery on all stock sizes for almost every AUTOMATIC TURRET LATHE & HAND SCREW MACHINE
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NATIONAL BROACH 18" Internal Gear Shaver Serial No. GCI-661.
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(3)—3½" Four Spindle
(1)—2¾" Four Spindle
(1)—1½" Four Spindle
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AIRCRAFT
Farnham Forming Rolls

Model 1558E
Capacity 15' x ⅝" Radius x .060 Duro.

Model 638
Capacity 6' x ⅜" Radius x 1/32 Duro.

Also—20' x 3/16".

Spar Mill
30' Onsrud A80. 4 Heads.

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TRiangle 5-5237

LATE MODELS

Brown & Sharpe No. 000 Prod. Mills
No. 9 Herbert Univ. Turret Lathe, Bar Feed
No. 2G Morey Turret Lathe Bar & Chucking 1943
No. 2SP Van Norman Plain Mill, 1941, Rebuilt
No. 624 Fellows Gear Shaper AC Motor, Bargain
No. 2C Oliver Arc Face Mill Grinder
No. 1 Bliss Toggle Press 7" Plunger Str. 3⅝" Blank Holder Str. M.D.
42" Throat, Wickes Heavy Duty Punch w/Architectural Jaws
Barber-Colman Type S Gear Hobbers
No. 16 Bryant Internal Chucking Grinders

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CAM MILLERS

VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CUTTER & TOOL GRINDERS

FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New), automatic indexing

DRILLING MACHINES

ALLEN: #2 High Speed, 15" overhang
CINCINNATI-BICKFORD: 1¼" upright
PRATT & WHITNEY: ½B x 50 Deep Hole Reaming Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
LIDKOPING: Centerless (New)
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—SURFACE

ARTER: A-1—8" Rotary
HEALD: No. 22 Rotary—12" Chuck

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"
JONES & LAMSON: #636 Universal, 6" dia. x 36" centers and one extra multiform wheel dressing attachment

HONING MACHINES

BARNES: No. 306H Vertical 24" Stroke
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

JIG BORING MACHINES

PRATT & WHITNEY #1 Jig Borer
SWISS #5B Jig Borer
LINDNER #14 & #15 Jig Borer, new

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical
NORTON: No. 26 Hyprolaps, for flat work & Cylindrical lapping

LATHES PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
REINECKER Relieving Lathe (new)
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LE BLOND: Regal, 15" swing x 42" centers
LODGE & SHIPLEY: #3A Duomatic. 25½" swing x 27" centers
POTTER & JOHNSTON: #6 DREL Automatic
PROGRESS: Geared head 16" to 30" swing (New)
TRIPLEX: 14" dia. x 40" centers Toolroom Lathes (new)
VDE New Engine Lathe 49" swing x 20' centers
VDE New Engine Lathe 27" swing x 23' centers

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SCHIESS: 41", 65" and 79" Vertical Turret Lathes (New)
WARNER & SWASEY 2A Turret Lathe
WARNER & SWASEY #3 Turret Lathe
BULLARD: 84" Vertical Turret Lathe
HERBERT: #2, #4, #7, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

PRESSES

LOGAN: 5-Ton Vertical Hydraulic Press

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

SHAPERS

HERCULES: 16" & 22" Shapers (New)
KLOPP: 16" to 26½" Shapers (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: 40A Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

CUTOFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
GOGAN BRINELL Hardness Tester Model 16-J
SHAPERS: Klopp 16 to 26½" (New)
SHAPERS: Hercules 16" & 22" (New)
SUNDSTRAND: 44" Double End Centering Machine
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Sundstrand 4-Sp. Vert. Rigidmill.
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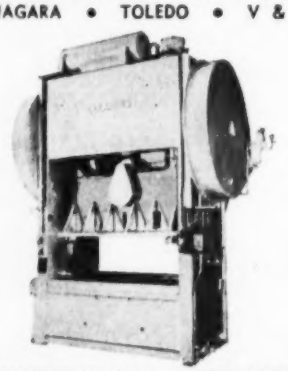

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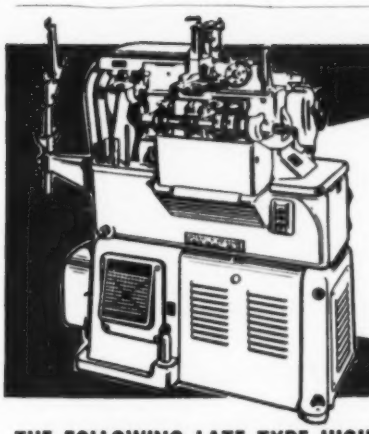

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3—No. 00G H.S. Serial Nos. 15343, 15345, and 15346 (1942); Swing Stop, ½" Spindle Cap., 6000 R.P.M. Spindle Speed, Motor in Base. Beaver-Bilt.

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3—No. 2G H.S. Serial Nos. 10690, 11731 and 11781 (1944); Swing Stop, Vertical Cutoff Slide, 1¼" Spindle Capacity, 3000 R.P.M. Spindle Speed. Motor in Base. Beaver-Bilt.

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K & T #4H & #4K Vert. Milling Machines, 1941
Sundstrand #1 Vert. Hydraulic Production Miller, 1943
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American Machinist

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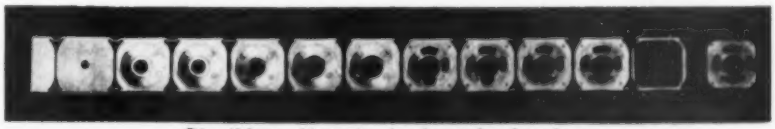
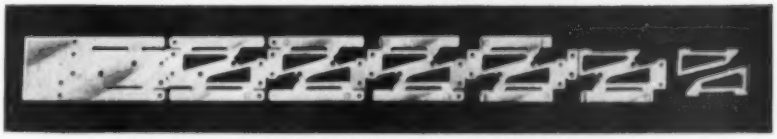


Die ribbon—11 station loud speaker housing



Die ribbon—7 station double wall bracket for glass shelf

Die ribbon—6 station fluid drive coupler

By running from 10 to 50,000 parts or complete assemblies for customer's production line use *before the die is delivered,* error is eliminated! guesswork ended! chance abolished! The die is certified PRODUCTION PROVED!

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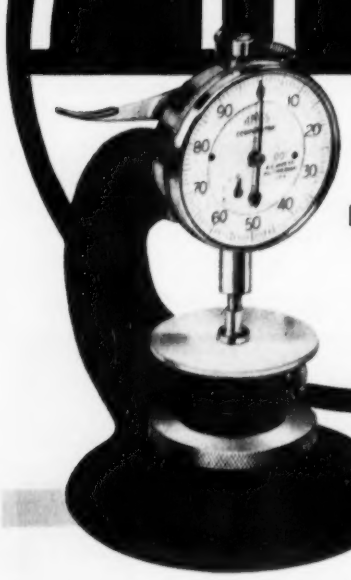

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Dial Comparator

This is smallest in the Ames' line of high quality dial comparators and it is ideal for desk or bench use in the fine inspection of small precision parts. It is light in weight, but its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a dial numbered 0-100, graduated in .001" and with a .250" range. Should your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for Ames Catalog No. 58 covering the entire line of Ames Top Quality measuring instruments or, better still, send complete details of your Quality Control problem. Ames will suggest a solution – no obligation, of course.

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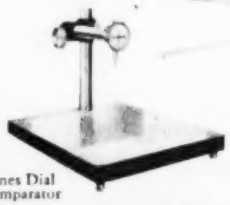
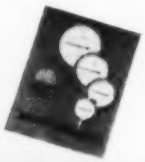


Ames Dial Comparator No. 130

Ames Caliper Gauge No. 12B



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Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

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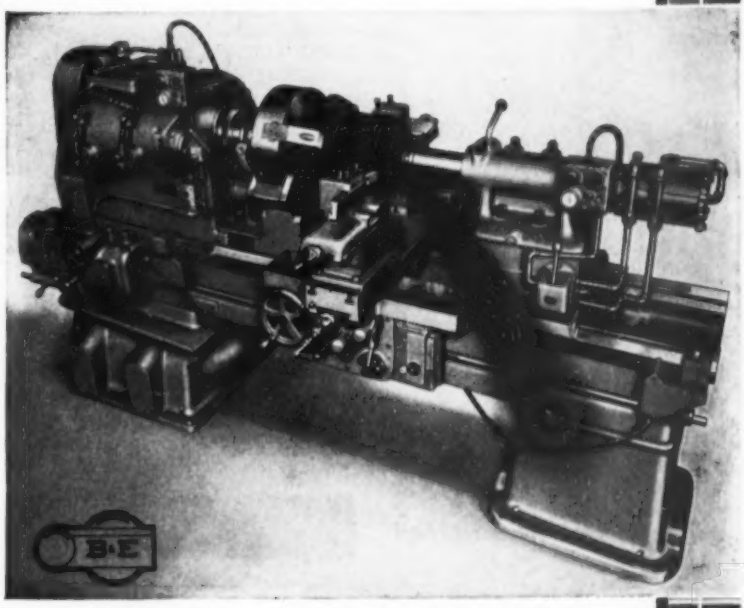
NOW BOYE' & EMMES Stamina IN SPECIAL PURPOSE LATHES

Turning requirements strictly special? Boye' & Emmes Long Life, Heavy Duty Engine Lathe stamina can still be yours. For Boye' & Emmes Special Purpose Lathes are built to the same basic specifications which identify "Long Life" with Boye' & Emmes Engine Lathes.

HEADSTOCK Stamina BECAUSE

(1) Gears are in constant mesh, speed changes made through sliding jaw clutches. No gear wear due to shifting.

(2) Herringbone "back gear" in front of spindle exerts a powerful downward thrust to offset lifting action of cutting tool.



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Double tapering of graphite nipples.

METHOD:

Stationary 18" air-operated chuck grips and centers work. Air-operated tailstock rams live spur center into end of workpiece, forcing it into headstock spur driver which extends through 6" center hole in chuck. Chuck then releases workpiece and cutting proceeds, front tool cutting taper from end to center while back tool cuts taper from center to end.

SPECIAL TOOLING:

Air-operated chuck. Air-operated tailstock. Front and rear tool holders. Taper attachment. Safety stops.

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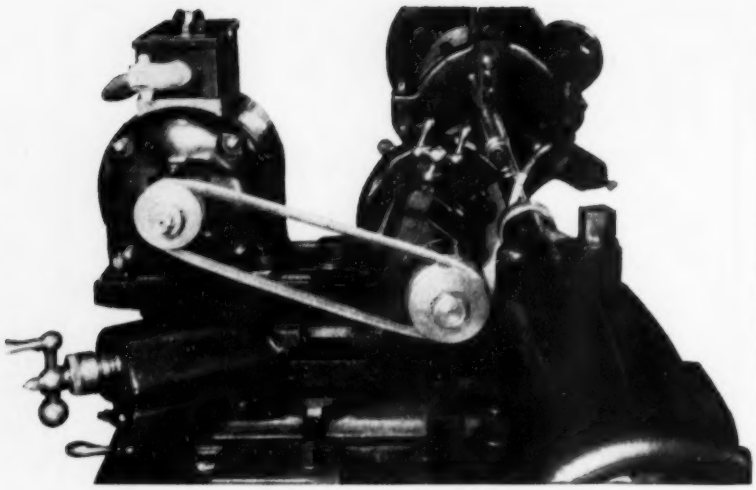
MACHINE TOOL COMPANY
125 CALDWELL DRIVE
CINCINNATI 16, OHIO



L + 4KX = ?

The symbols in the above equation represent your Lathe and a "HISEY" type 4KX Precision Grinding Head. The answer is truly a precision grinder.

Illustration at left shows the 4KX 1 H. P. Grinder with external grinding head mounted, including 10-inch diameter wheel.

The special internal spindles are interchangeable with the external spindle, permitting a wide range of external, internal and surface grinding operations.

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GET to know your people *before* you have to get tough with 'em. It's poor policy to make their acquaintance by bawling 'em out. Introduction by insult is no longer a successful management routine.

THE old Army slogan, "If it moves, salute it; if it doesn't, pick it up; if you can't pick it up, paint it," can well be adapted for plant use by changing "salute" to "guard" and "paint" to "oil."

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"Job Engineered" to do a hundred and one jobs

POUND FOR POUND, dollar for dollar, you can't beat the value in CLARK'S POWRWORKER Line. You get big-truck benefits at rock-bottom, small-truck cost. Take the POWRWORKER stacker, for example: a rugged, modern fork truck, but cut to fit the tighter handling pattern of narrow aisles, low-load floors, limited budgets. Short turning radius, easy finger-tip control and ample power-plant assure fast, safe handling and stacking. Truly big-truck performance in an economical package.

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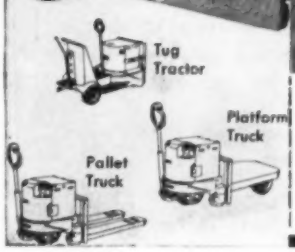
1903 1953 CLARK EQUIPMENT



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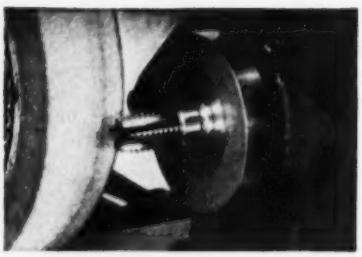
Precision tap sharpening is helping many manufacturers reduce tap costs up to 75%. It also enables them to get greatly increased production from each tap and makes possible a sharp reduction in tap breakage. It can benefit you, too!

WHAT PRECISION SHARPENING IS

Precision tap sharpening is a method of controlling the accuracy of tap indexing (keeping cutting edges uniform and evenly spaced), controlling the rake angle of cutting edges and providing uniform chamfers. These results enable a tap to cut more accurately and uniformly for a much longer period of time than is possible when the precision sharpening method is not used.

THE IMPORTANCE OF BLAKE EQUIPMENT

Until the introduction of Blake tap sharpening equipment a few years ago, no practical method was available to realize the benefits of precision sharpening. The Blake Flute Grinder and Blake Chamfer Grinder are recognized today as the only practical means of putting precision sharpening into actual operation.



TAP IN POSITION FOR PRECISION SHARPENING

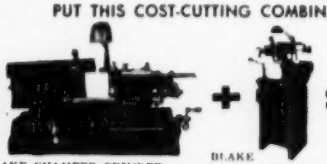
Photograph shows four-fluted tap in correct position for precision chamfer grinding on Blake Tap Chamfer Grinder.

SEND FOR MORE FACTS NOW!

A recent *Machinery* article, "Why Taps Should Be Sharpened Precisely", contains complete information on this interesting and profitable subject. Write us for your free copy. Bulletins about both Blake machines are also available on request.

IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.

PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!



BLAKE CHAMFER GRINDER (Described in Bulletin 531) + BLAKE FLUTE GRINDER (Described in Bulletin 651) =

ACCURATE, TRUE-CUTTING TAPS
LESS TAP BREAKAGE
600% MORE PRODUCTION PER TAP
UP TO 75% REDUCTION IN TAP COSTS

Write for details about both machines!

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SEE BLAKE MACHINES IN OPERATION AT BOOTH 1711 (A. S. T. E. EXPOSITION, MARCH 17-21)!

From the *American Machinist* Library of *Tips for Top Shop Men*

YOUR manufacturing engineers should have just one job: to make your present methods obsolete. The more they succeed, the greater is your productivity.

AN invisible boss presides over every collective bargaining session. He is not labor, management, or government—but is the customer, who exercises power of selection over your company's products.

TWO of management's most important words are "know" and "no." If you're strong on the first, you seldom hear the second.

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...the word from the wise in milling cutter circles

The modern Lovejoy line of inserted-tooth milling cutters are ordered and reordered on the basis of performance. Proof? . . . our first customers are still with us after 30 years of satisfaction.

The modern Lovejoy line has never been more complete. Improved new designs, both standard and special, are coming constantly from our large engineering staff.

The modern Lovejoy line features the exclusive "positive-locking" device to allow maximum use of each blade and minimum loss in sharpening.

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Single purpose production machines with automatic feeds are cost reducers.

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TO TOUGH-TOOL DESIGN PROBLEMS
. . . are thoroughly discussed

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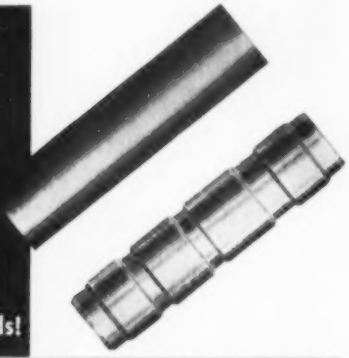
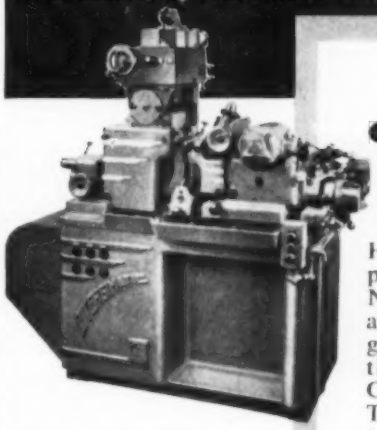
From blank to finished piece in
12 SECONDS
with
DIVERSIMATIC
...20 minutes by conventional methods!





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Centerless grinds small parts faster from the SOLID!

Here's the newest step to greater production... greater economy! Now, many small, formed parts and multi-diameters can be ground direct from the solid on the DIVERSIMATIC! The CRUSH FORMING ATTACHMENT dresses the wheel to desired contour and holds the form hundreds of pieces longer between wheel dressings, imparting the exact profile to the work. Also finish grinds rough-turned parts. Grinds faster, holds tolerance, cuts costs!

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The Centerless Grinder with the spindle that needs no warm-up!

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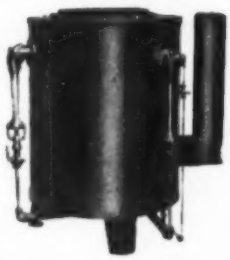
NO BLOWER or POWER NECESSARY



UP TO 1650° F. QUICKLY ATTAINABLE

Just connect to your gas supply and this BUZZER Atmospheric Pot Furnace is ready for operation. An innovation in design they are unbeatable for salt bath or lead hardening. Even heat, close control, high efficiency are only few of the many features. Available in many sizes.

Send today for the BUZZER catalog.

CHARLES A. HONES, INC

We can learn from bankrupt Micawber

"MY advice, Copperfield, you know. Annual income twenty pounds, annual expenditure nineteen-nineteen-six, result happiness. Annual income twenty pounds, annual expenditure twenty-ought-six, result misery. The blossom is blighted, the leaf is withered—in short you are forever floored. As I am!"

This is probably the most famous financial counsel in all English literature, offered a hundred years ago by Charles Dickens' character the bankrupt Micawber to the hero David Copperfield. As advice it is just as good in 1953 as it was in 1849, and just as sound for a nation as for an individual.

In 17 of the last 20 years, Uncle Sam has followed Micawber's practice, not his advice. Our national balance sheet has been, figuratively, "annual income twenty pounds, annual expenditure twenty-ought-six". Ahead of us as a nation, if we continue this irresponsible policy, is Micawber's dire predicament, "blossom blighted, leaf withered—forever floored".

There is no sane reason why the world's richest nation should continue to live the financial life of a profligate bankrupt. It is time now to set our house in order. The program called for is simple: (1) Eliminate waste and extravagance in government spending; (2) Balance the Federal budget; (3) Control the national debt and reduce taxes.

By such positive action we can protect future happiness—and prevent misery—for ourselves, our children and our children's children.

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MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

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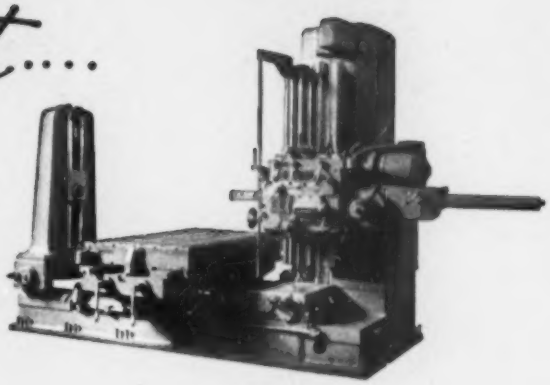
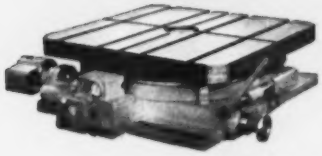
however you figure it....

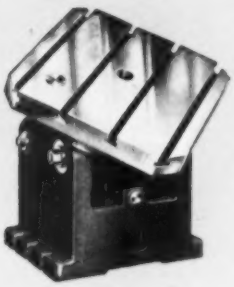
Gilberts pay off!



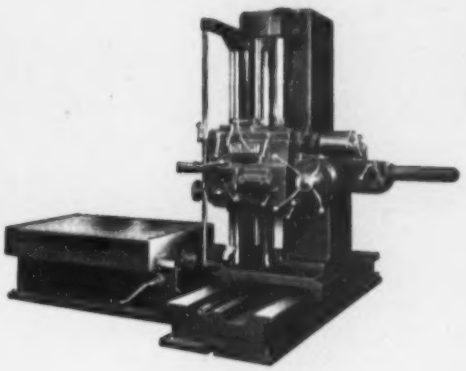
Whatever your yardsticks—sustained accuracy, operator convenience, long life, work per hour, or earning power per square foot of floor space —you'll find Cincinnati Gilbert's advanced construction features provide long range paying investments. On your next purchase of radials or horizontal boring mills check with your nearby Cincinnati Gilbert representative

Horizontal Boring Mill: Compound rectangular table type. Head travel: 36" to 72". Bed: 84" to 120". Spindle diameter: 3½" or 3¾". Write for Bulletin 1040-R. Compound built-in rotary table types also furnished in comparable sizes: Bulletin 348.

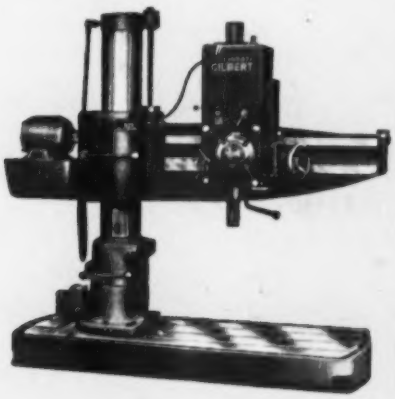




Rotary Table: (*left*) Worm driven with power rapid revolving. Hand adjustment made with dial on worm shaft reading in minutes. Dial type indexing, 36" and 50" square or round.
Universal Table: (*right*) Five sides of a cube can be machined at one setting of work piece.
Sizes: 22" x 22" and 27" x 27" top.



Horizontal Boring Mill: Floor type. Head travel: 36" to 96". Column traverse: 36" to 168": Spindle diameters: 3½" or 3¾". Can be equipped with floor plates; boring bar supports; stationary, sliding, or built-in rotary tables; revolving columns, and special arrangements. Write for Bulletin 1244.



Radial Drilling Machine: 9" and 11" columns. Centralized, "comfort level" controls. 12 speeds, 6 feeds. Twelve basic features make these the most modern radials you can buy. Write for Bulletin 349.

THE CINCINNATI

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MACHINE TOOL COMPANY

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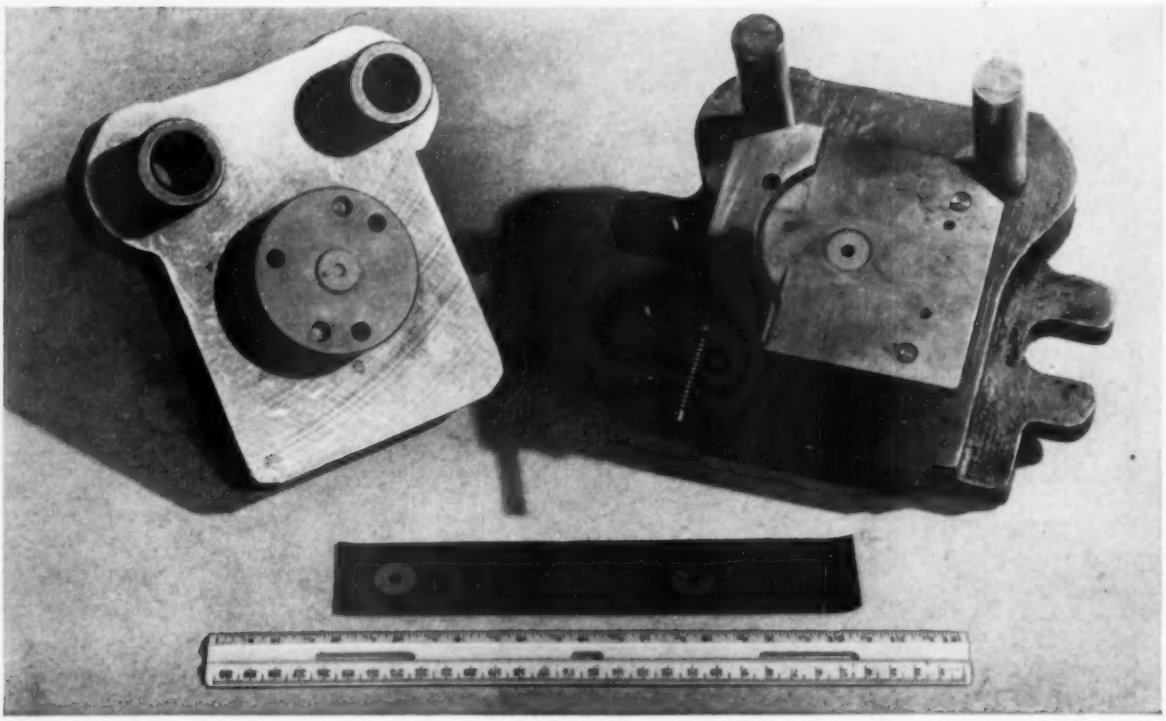
Graph-Mo® steel dies produce up to 80,000 parts without throwing burrs!



THE Reliable Tool and Die Company, Cleveland, Ohio, was having trouble with the chromium and carbon dies it used in making small, intricate gears and parts for electric motors and toy mechanical winding motors.

The dies were throwing burrs. The parts often tore when broached. Gear teeth spalled in the dies. And die life was short due to chipping of the cutting edges.

Then Reliable's engineers tried Graph-Mo®, one of four Timken® graphitic tool steels. The Graph-Mo blanking dies produced as many as 80,000 parts without a single burr. Because of free graphite in its structure, Graph-Mo has outstanding low-friction properties: minimum tendency to scuff, seize, score or gall. Tearing and spalling were eliminated. And the cutting edges stayed sharp and true because the diamond-hard carbides in Graph-Mo give excellent resistance to wear and abrasion.

Graph-Mo also offers other advantages. It responds uniformly to heat treatment, permitting close tolerances in the parts. It has good stability, and is easier to machine than ordinary tool steels.

For information on the four Timken graphitic tool steels and their use in punches, dies, gages and machine parts, get the new 10th edition of "Timken Graphitic Steel Data Book". Write on your business letterhead to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

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